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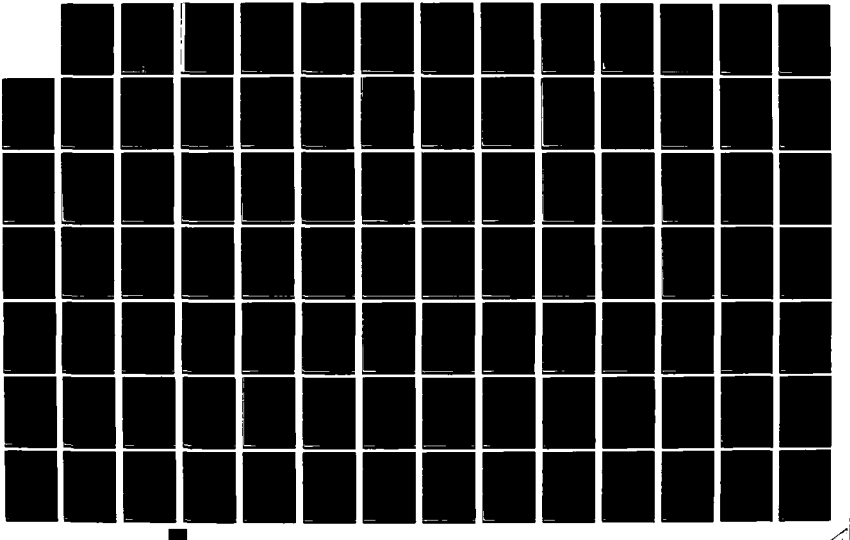

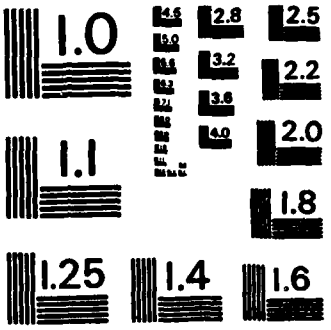

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20. Abstract

With the aid of five-fold double stage impactors and particle size analyzers after Knollenberg continuous measurements are taken of the aerosol particle spectrum (between 0,1 and approx. 20 µm) at our mountain stations (740, 1780, and 3000 m a.s.l.).
Many years' measuring series on a statistically significant basis are used to determine the dependence of the particle spectrum and particle concentration on altitude as a function of various meteorological parameters. Results basing upon Knollenberg particle spectra are reported. By comparing rawinsonde data over 85 km horizontal distance it is suggested that the data obtained at our stations are not noteworthy influenced by the existence of the mountains.

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PARAMETERIZATION OF THE VERTICAL PROFILE OF THE AEROSOL CONSTITUTION IN THE LOWER TROPOSPHERE AS A FUNCTION OF METEOROLOGICAL CONDITIONS AND HORIZONTAL EXTENSION

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30 April 1979

Interim Scientific Report, 1 March 1977 - 28 February 1979

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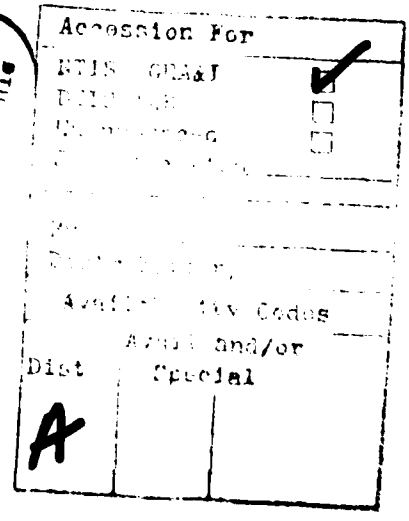


1. CONTRACTUAL WORKS WHICH HAVE BEEN DISCUSSED IN THE TWO PRECEDING REPORTS

1.1. Interim Scientific Report, 1 Mar 1977 - 28 Feb 1978

This report gives at the beginning an introduction into the general significance of the work under contract. Subsequently, the methods used for a solution of the problem are described. In particular, we have outlined in detail all procedures applied to determine and numerically evaluate the particle size spectrum by means of a five-fold double stage impactor at three stations, namely:

Garmisch-Partenkirchen, 740 m

Wank, 1780 m

Zugspitze, 2964 m.

The separation functions of the five-fold double stage impactor are given with full particulars (Fig. 8). The mean diameters per impactor stage at a particle density = 1 are indicated as follows:
4.75 / 2.09 / 0.972 / 0.461 / 0.233 microns.

The manner in which particles are counted on the slides behind the slits of the impactor stages is described in detail. As outlined in the mentioned report, this is done with the aid of an automatic scanning microscope.

The same report gives a first description of the Knollenberg particle size analyzer which functions with a laser and delivers automatically hourly means of the aerosol particle spectrum between 0.32 and 20 microns.

The stations at which measurements of the particle size spectra are taken are described. Examples of measurements are enclosed. The mobile lidar system to be operated as well within the scope of the contract is also briefly described.

1.2. Non-Scheduled Progress Report No. 2, Period 1 March 1978 - 31 August 1978

This report sets forth a first parameterization of the particle spectra obtained by the five-fold double stage impactor according to various meteorological aspects. Results are presented in tables and graphs. These tables and graphs reflect probably for the first time a statistically significant insight into the time variations of the particle size distribution simultaneously at three altitudes of the lower troposphere inasmuch as the data material covers a total of 11 years' regular measurements.

This first parameterization may thus have furnished already a series of valuable and representative results in terms of the topic set in the contract. Specifically, they may be suited to provide available mathematical models - e.g. Lowtran - with realistic parameters.

In the present report we wish to avoid repetitions regarding description of stations, methods used, and evaluation procedures, and ask therefore to refer to the respective preceding report for information.

2. MAIN TOPICS OF INSTANT REPORT

2.1. Measurements Performed in General

Once daily exposures of the five-fold double stage impactor mentioned in the previous reports have been continued and the results evaluated at all three stations. Since we have parameterized in the last report a sequence of 11 years, it is not worthwhile to present here again a compilation of data. This will be done at the end of the contract.

However, it is essential to note that continuous measurements with the Knollenberg particle size analyzer (classical type) have been performed during the reporting period, strictly spoken in the following time:

Garmisch-Partenkirchen, 740 m a.s.l from 1 August 1977 on,
Station Wank, 1780 m a.s.l. likewise from 1 August 1977.

This instrument delivers as mentioned before in report 1.1. (see Figs. 14 and 15 there) hourly means of the particle spectrum over a very wide range from 0.32 to 20 micron. During the reporting period these instruments have been operated virtually without interruption at the 2 stations. Calibration measurements for checking the system constants of the instruments (size distribution, absolute indication of particle number per size class) have been carried out and the two instruments were adjusted to each other.

Taking into consideration that we obtained hourly values during the above mentioned time spans, it was appropriate to make in the present report an attempt at a first com-

prehensive parameterization of the measurements performed with the Knollenberg particle size analyzer.

2.2. Electronical Improvement on the Knollenberg Particle Size Analyzer

The commercial version of the Knollenberg particle size analyzer proved to be unsatisfactory in the following respect: The given automatic measuring cycle allowed only one and the same accumulation time per particle range, we fixed the measuring cycle over the 4 ranges with 5 minutes each to a total of 20 minutes and formed the mean value of the 3 cycles for one hour each.

The 4 ranges (subdivided into 15 channels each) are fixed after Knollenberg in the following way:

range 0: 2.0 to 20 micron Ø, ΔD/channel: 1.2 micron

range 1: 1.0 to 12.3 micron, ΔD/channel: 0.75 micron

range 2: 0.50 to 2.8 micron, ΔD/channel: 0.15 micron

range 3: 0.32 to 0.76 micron, ΔD/channel: 0.029 micron

Hence, accumulation time was 5 minutes per range, that means, that the number of large particles per 5 minutes in range 0 was insufficient for a statistical assessment whilst, conversely, in range 3 an excess of small particles was recorded. Therefore, we designed and constructed an additional electronic unit - for each of our instruments - so that now different accumulation times are freely selectable in all ranges.
Presently we use the following division:

range 0: accumulation time over 13 minutes

range 1: accumulation time 4 minutes

range 2: accumulation time 2 minutes

range 3: accumulation time 1 minute

This additional unit was found to be an essential improvement. It is operated at both stations for some months now. Nevertheless we wish to present in the last part of this report as a first preliminary result the parameterization of the particle size distributions according to the previous method.

2.3. Improvements and Conclusion of Technical Developments on the Mobile Three-Frequency Lidar

During the reporting period several technical improvements, extensions, and especially calibration measurements in different wavelengths turned out necessary. The instrument is now in operable condition. Some examples of measurements will be shown later in a special chapter.

2.4. Comparison of Structures of Temperature and Humidity Lapse Rates Between Our Own Rawinsonde in Garmisch-Partenkirchen and the Munich Rawinsonde

An important aspect to be handled within the framework of the research topic is the necessity to furnish proof of the far-reaching geographical significance of the results obtained at our mountain stations, i.e. in the northern Alps, and to establish that they are not only valid locally for the measuring site. This should be proved, in the first

place, with the mobile lidar.

However, we have seen a reasonable chance to furnish such proof also by comparing the structures in rawinsonde lapse rates. A separate report hereon is given in chapter 4.

2.5. First Parameterization of Data Obtained with the Knollenberg Particle Size Analyzer According to Various Meteorological Aspects with Consideration to the Diurnal Variation

As mentioned before, we wish to present a first preliminary result of a parameterization and consistent description of particle spectra obtained so far at the 2 stations Wank and Garmisch-Partenkirchen although the necessary technical improvement (2.2.) was made only in the recent past. Consequently, these data are of a provisional nature but permit nevertheless quite valuable insight without claiming to be of general validity. Description follows in chapter 5.

3. EXAMPLES OF MEASUREMENT WITH THE TWO LIDAR SYSTEMS

Figs. 1 and 2 give randomly chosen examples of simultaneous vertical measurements with the mobile (mob.) and stationary (stat.) lidar which are both installed at our Institute. Wavelengths, in which measurements are taken, are indicated at the upper margin of the figure. In the respective identical wavelength one finds an excellent agreement of measuring results, especially of aerosol structures which manifest themselves in stepped variations

of the profiles. Because of the smaller receiving mirror of the mobile lidar, the background noise in the short range wavelengths is greater than with the stationary lidar. It should be noted, however, that the curves which are reproduced here are not smoothed. A considerable improvement can still be achieved by smoothing.

Whereas Figs. 1 and 2 indicate merely the relative backscatter intensity, Figs. 3 and 4 give the absolute concentration for two particle ranges (coarse and fine, resp.), based on the simultaneous lidar measurements in two to three different wavelengths. Mean diameter for the coarse aerosol is 0.4 /um, that for fine aerosol 2.0 /um.

The vertical profiles are obtained by in-situ calibration using the Knollenberg particle concentrations measured at the station Wank (marked by W). Figs. 3 and 4 shall demonstrate that it is now possible to obtain in two particle size ranges the absolute concentration of particles per m^3 by simultaneous lidar backscatter measurements in different wavelengths. The two lidar systems are thus ready for operation.

Under the present contract it is planned to determine the aerosol profiles simultaneously with both instruments in vertical direction but increasing horizontal distance. In this manner the horizontal validity of aerosol profiles obtained at our stations will be re-checked and confirmed.

Due to both technical improvements and calibration works which still turned out to be necessary in the reporting period and extremely bad weather conditions, carrying out of such measurements was not possible before spring 1979 inclusive. But now they are at last in sight and we shall

start as soon as all external circumstances are satisfactory.

Alternatively, we use radiosonde comparisons which are discussed in the chapter following below.

4. COMPARISON BETWEEN TEMPERATURE AND RELATIVE HUMIDITY RAWINSONDE LAPSE RATES IN MUNICH AND GARMISCH-PARTENKIRCHEN

Within the scope of comprehensive studies (Parameterization of Aerosol Eddy Diffusion Controlled by the Aerological Structure, R. REITER, R. SLADKOVIC, W. CARNUTH, Arch.Met. Geoph.Biokl. Ser. A, 23, 297-322 (1974)), it has been established that the vertical gradients of temperature and water vapor pressure are in regular conformity with the incremental exchange coefficient A_i. In other words: The temperature gradient within the reach of an inversion determines definitely the intensity of the vertical exchange through the inversion layer no matter how thin it may by then. The same applies to the gradient of water vapor as well as relative humidity - depending on the respective point of view. Figs. 5 and 6 show the dependence of the vertical incremental exchange coefficient A_i on the temperature gradient and water vapor pressure, respectively.

In the same publication it has been established that the incremental exchange coefficient determines the gradient of the aerosol concentration at the same height interval. In other words: If a temperature inversion develops within which the vertical exchange coefficient assumes a minimum,

then a strong gradient of aerosol concentration forms very quickly at the same height interval in a way, that above the inversion correspondingly low, but below the inversion high aerosol concentrations are measured. These relationships are conclusively evidenced by thousands of vertical profile measurements of the aerosol concentration (in part directly by Aitken nuclei counter, and partly by means of the electrical conductivity of the air).

In view of these basic findings we considered it important to clarify by comparing the structures of temperature and humidity lapse rates of 2 radiosondes of large mutual distance, i.e. between Garmisch-Partenkirchen and Munich Airport (85 km) to what extent there is large-scale agreement not only with regard to the aerological structure but thus necessarily also with regard to the aerosol structure.

For such an investigation we had available 47 radiosonde ascents performed at our station in Garmisch-Partenkirchen. At first we considered merely the mean temperature departures at 500, 700, and 850 mb level between the two radiosondes. The result is evident from Table 1.

Table 1

850 mb	$\overline{(T_M - T_{GAP})}$	$= -1.0^{\circ}$
700 mb	$\overline{(T_M - T_{GAP})}$	$= -0.6^{\circ}$
500 mb	$\overline{(T_M - T_{GAP})}$	$= -0.6^{\circ}$

T_M = mean temperature Munich

T_{GAP} = mean temperature Garmisch-Partenkirchen

This table shows that, on the average, differences between the two radiosondes are insignificant at the three levels. The trend of the departure, i.e. the temperature above Munich, is somewhat less than over Garmisch and comes up to expectations. Figs. 7 - 9 give the absolute frequency of the noted mutual deviations of the radiosonde data. As it is to be expected, the deviation is greater near above ground (850 mb) alone on account of the geographical height difference between Garmisch-Partenkirchen and Munich (200 m). At higher altitudes, however, the frequency distribution is relatively narrow, i.e. both radiosonde data fit reasonably well to each other.

It is now important to compare whether temperature and humidity structures in both radiosondes at 85 km horizontal distance occur simultaneous in time or not.
Table 2 gives an overview.

Table 2

a) no structures	4 ascents = 8.5%
b) structures, but without possibility of comparison (either apparent just in one temp or correlation of layers impossible)	14 ascents = 29.8%
c) structures <u>with</u> possibility of comparison and in good conformity	21 ascents = 44.7%
d) c as well as b	8 ascents = 17.0%

The case, that structures are absent altogether in both radiosondes constitutes 8.5%. Hence, we have here already a <u>positive</u> agreement. The frequency, that structures do

occur but are not comparable to each other regarding their altitude level is only 29.8%. In 44.7% of the cases, however, we have structures which show good conformity with respect to shape and altitude level.

It can just as well happen, however, that in case of multiple structures in the same radiosonde pair one sometimes observes a conformity and sometimes not. Such poor agreement is frequently found near the ground which is easily understood. Hence, we can state a partial agreement in such cases, too.

If we summarize all cases in which good conformity could be established, we come up to round 70%. This means, that despite a distance of 85 km between the northern Alps and flat country one finds a satisfying agreement in the structure of temperature and humidity lapse rates. In the light of the initially mentioned experiences that is also an analogous agreement with respect to the aerosol structures as far as they are determined by meteorological atmospheric conditions.

Finally, the following investigation is also of interest: Since not only temperature and humidity structures are in good conformity as evident from visual comparison, we considered it valuable to find out also the extent of the difference in atmospheric pressure at the top or base of the temperature and humidity structure, respectively.

We calculated this for pressure in mb and potential temperature.
Results are compiled in Table 3.

Table 3

mean pressure difference at the base	$\overline{p_M - p_{GAP}}$	= -5 mb
mean pressure difference at the top	$\overline{p_M - p_{GAP}}$	= -3 mb
difference of potential temperature		
base	$\overline{\theta_M - \theta_{GAP}}$	= -0.74°
top	$\overline{\theta_M - \theta_{GAP}}$	= -0.33°

Consequently, we note that despite the large horizontal distance only quite insignificant vertical differences exist in the altitude level of temperature and humidity structures, respectively.

In conclusion, we will show some randomly selected individual examples in form of graphs in which lapse rates for temperature and humidity have been inserted. (T = temperature lapse rate; H = lapse rate of humidity).

It should be added here that temperature and humidity are evaluated by our computer with appreciably higher time resolution than it is the case with the routine radiosonde of the Weather Service in Munich. It may easily happen, therefore, that fine structures get lost in the Munich radiosonde which we here in Garmisch-Partenkirchen can still clearly perceive. When comparing the lapse rates in the figures following, this difference in the detailed processing should be considered.

Fig. 10:

Very good agreement of T in almost all layers, merely the ground inversion over Munich is without counterpart in Garmisch-Partenkirchen which is of no practical importance (geographical height difference). Extremely strong layers and inversions, respectively, are found around 750 and 630 mb with very good agreement of pressure and potential temperature. This applies to T as well as to relative humidity.

Fig. 11:

Both T lapse rates without notable structures, i.e. good agreement. Differences in the relative humidities may surely be caused by cloudiness since in Garmisch as well as in Munich the values approximated temporarily to 100%.

Fig. 12:

Very good agreement of the ground inversion up to about 870 mb; above it complete conformity in both lapse rates of T. When considering the crude radiosonde evaluation for H in Munich, one finds good agreement in case of the relative humidity, too.

Fig. 13:

In principle, good agreement between the structures with slight vertical shifts up to 750 mb, complete conformity of the isotherm between 600 and 500 mb in the case of T. Excellent agreement of relative humidity between earth surface and 750 mb.

Fig. 14:

Lapse rates for T practically identical with a sharp kink at 300 mb in complete mutual conformity. Further, good agreement in the case of relative humidity. Here we may say that obviously a completely homogeneous air mass prevailed between Garmisch-Partenkirchen and Munich.

Fig. 15:

In the lowest layer from ground to 770 mb some striking differences in the temperature structure; above it, however, complete conformity between T in both radiosondes. In general, good conformity of relative humidity, too. Hence, horizontal differences may be given here relative to the temperature structure in the boundary layer.

Fig. 16:

Marked differences near the ground: A ground inversion with isotherm up to 870 mb - which does not exist in Munich - shows up in Garmisch-Partenkirchen. At heights greater than 850 mb, the structure of T is almost identical, mainly in both T lapse rates an analogous inversion is clearly marked around 700 mb which is also evident from the corresponding trend of H.

Fig. 17:

Here we have quite an exceptional case: A clearly marked inversion over Garmisch-Partenkirchen which is absent over Munich. A horizontal difference in the aerosol structure is thus very likely to occur. Further aloft, from 750 mb, however, both radiosonde data are identical. Hence, in this

case, the particle spectrum obtained at the Zugspitze may certainly be valid also for the Munich region at same altitude.

Fig. 18:

Apart from a subsiding inversion at 350 mb over Garmisch, the trend of the two lapse rates is very simular, mainly between 950 and 700 mb. On the average, however, the temperature in Munich is lower than that in Garmisch which possibly is indication of a different air mass type.

Fig. 19:

Mention be made here above all of the simultaneous drying-up of the air between 600 and 450 mb over Munich and Garmisch-Partenkirchen which suggests a corresponding analogous alteration of the aerosol concentration and aerosol size distribution. Otherwise, the T lapse rates show little structure at both stations. Conspicuous is merely the fact, that now temperatures in Munich are lower without exception than in Garmisch which again may point to an air mass difference.

In summary, it can be said that over a distance of 85 km in the free atmosphere, in a surprising number of cases significant agreement can be established between the vertical structure of meteorological parameters which have a direct and dominating influence on aerosol size distribution and aerosol concentration. It can therefore be concluded with sufficient certainty that the aerosol parameters obtained at our stations, mainly at the mountain stations, are of geographically far-reaching importance and validity.

5. FIRST PARAMETERIZATION OF KNOLLENBERG PARTICLE SPECTRA OBTAINED BY THE KNOLLENBERG PARTICLE SIZE ANALYZER WITH SPECIAL CONSIDERATION OF THE DIURNAL VARIATION

5.0. Preliminary Remark

The plots following show the diurnal variations of particle concentrations in the form

$$\frac{dN}{D} \log D \text{ per } cm^3$$

as they have been measured at the stations Garmisch, 740 m, and Wank, 1780 m a.a.l.

The key value "PARAMETER" indicates what we selected from the total data records (see line 2, upper part of the plot). Line 3 states the number of selected days, line 4 the particle size in µm diameter (refer to pages 12 - 15 of our Interim Scientific Report, dated 30 April 1978).
On principle, we used only hourly means of the particle spectrum.

The evaluation period ranges from

01.08.77 - 15.09.77 and

06.03.78 - 15.04.79

The particle numbers given below mean invariably particle per cm^3.

5.1. Plot 1.1 - 1.9

PARAMETER: Relative duration of sunshine = 100 %

On fair weather days, the daily variation is well defined.

In Garmisch the trend of the concentration is very smooth (Plot 1.1 - 1.4). The concentration peaks in the early morning hours and is at minimum at noon.
In case of the smallest particles (Garmisch) maximum rate of measured particles is 436 at 03.00 and 139 at 13.00. Analogous extreme values for Wank are 206 particle at 00.00 and 60 particle at 11.00, respectively.

The peak value at 23.00 is likely to be a result of particle growth. The greater the particle diameter, the greater the amplitude of the daily variation (Plots 1.2, 1.3, 1.4, 1.5).

Extreme values of particle concentration (cm^{-3}) for single particle sizes

	Garmisch		Wank	
/um Ø	Max	Min	Max	Min
0.42	436	139	206	60
0.64	144	19	81	7
1.25	54	2,7	17	0,87
1,84	40	0,7	17	0,23
2,32	14	0,31	11,6	0,08

In Garmisch the concentration is about twice as high as at Wank.

The single peaks in the different variations must be imagined as not being there (fog-effect). Coarse particles are usually of very low concentration. If it happens that in computing the mean values one obtains sporadically a conspicuously high value as a result of fog, then the mean value as such is strongly falsified (this concerns all plots from 1.3 to 1.9 and others).

5.2 Plot 2.1 - 2.9

PARAMETER: Temperature gradient between Garmisch and Wank
>-0.1 degree/100 m (very stable stratification)

In this case the amplitude is essentially smaller than in the Plot 1. Upon selection of the fair weather days, maximum and minimum occurred in the valley and at Wank almost simultaneous in time (approx. 03.00 and 13.00, resp.).
In the present case of parameterization the maximum in the valley shows up somewhat earlier, i.e. 00.00 - 01.00.
The concentration reaches values which are twice as high (small particles) or 5 times higher (coarse particles) as the mean value on fair weather days. On Wank the concentrations differ essentially because the peak lies in another air mass above an inversion which acts as boundary layer. The aerosol maximum is observed later at 06.00. The same applies to the minimum (17.00 - 21.00). The concentration of small particles is just negligibly higher than it was the case on fair weather days. The concentrations of coarse particles, however, are now 10 to 100 times higher as on average fair-weather. This may result from persistent particle coagulation in the stationary air mass above the inversion, therefore we have an excess of coarse particles at the Wank.

5.3. Plot 3.1 - 3.9

PARAMETER: Temperature gradient <-0,85 degree/100 m between Garmisch and Wank (very unstable stratification)

In the valley the amplitude of the daily variation is greater than in Plot 2 (convection course). Concentration of small particles is only little lower than in stable stratification. As it was to be expected, the difference is appreciably higher in the case of coarse particles. In unstable weather the presence of large particles in the valley is less by a factor of 200 (compared to Plot 2) as a result of "rarefication". The second reason is that due to instability there is now frequent precipitation and washout as contrasted to stable stratification.

Conditions other than on Plot 2 prevail now at the Wank where the influence of fog becomes apparent through convection. On Plot 3.7 we note a concentration which is considerably higher than in stable weather. For the most part the situation is marked by front passages and frequent fog at the Wank.

5.4. Plot 4.1 - 4.9

PARAMETER: In Garmisch (valley) Radium B concentration >400 pcie/m^3, i.e. likewise distinctly stable stratification.

Garmisch: Practically identical with the result for stable weather (temperature gradient >-0,10 = Plot 2), that means adequate confirmation.

Wank: Maximum in the evening hours, minimum in the early morning till noon.

At Wankconcentrations of coarser particles are smaller which is suggestive of a different air mass type.

5.5. Plot 5.1 - 5.9

PARAMETER: In Garmisch (valley) Radium B concentration <40 pcie/m^3, i.e. bad weather with marked unstable stratification.

In all ranges, most notable in the range of coarse particles, higher particle concentrations are found at the Wank than in Garmisch. We have frontal and post-frontal days with influx of fresh air, that means fog at the Wank and consequently concentrations of coarse particles are higher there than in Garmisch (particle growth at high humidity).

The minimum at Wank and in Garmisch occurs almost uniform at approximately 14.00 - 16.00.

5.6. Plot 6.1 - 6.9

PARAMETER: Relative humidity in Garmisch during the night from 22.00 - 09.00 <70 %.
A very rare event (9 days only), extreme dryness.

The daily variation is at minimum in the night around 00.00 - 02.00 and maximizes between 20.00 and 22.00. This variation is equivalent to a pre-frontal weather situation. At night still Foehn exists down to the valley, therefore we find an extremely low minimum of particle concentration.

In the course of the day a front crosses regularly our area followed by high humidity and fog at the Wank. Consequently, the concentration of coarser particles enhances considerably as the day progresses (growing of particles, finally fog).

5.7. Plot 7.1 - 7.9

PARAMETER: (Data from Wank only), extreme values of air pollution:

left side of the plot : $>0{,}040$ mg/m^3] total aerosol mass
right side of the plot: $<0{,}001$ mg/m^3]

The difference in particle concentration of these two extreme aerosol conditions makes up a factor of 5 to 10 (depending on the size class).

5.8. Plot 8.1 - 8.9

PARAMETER: (Data from Wank only), extreme conditions of visibility:

left : <2 km]
right: >98 km] at Wank peak

At highest visibility the particle concentration falls below 20 particle/cm^3 even in the smallest size range.

In fog (visibility <2 km) concentrations of about 2700 are reached simultaneously in the corresponding size class.

6. CONCLUSION

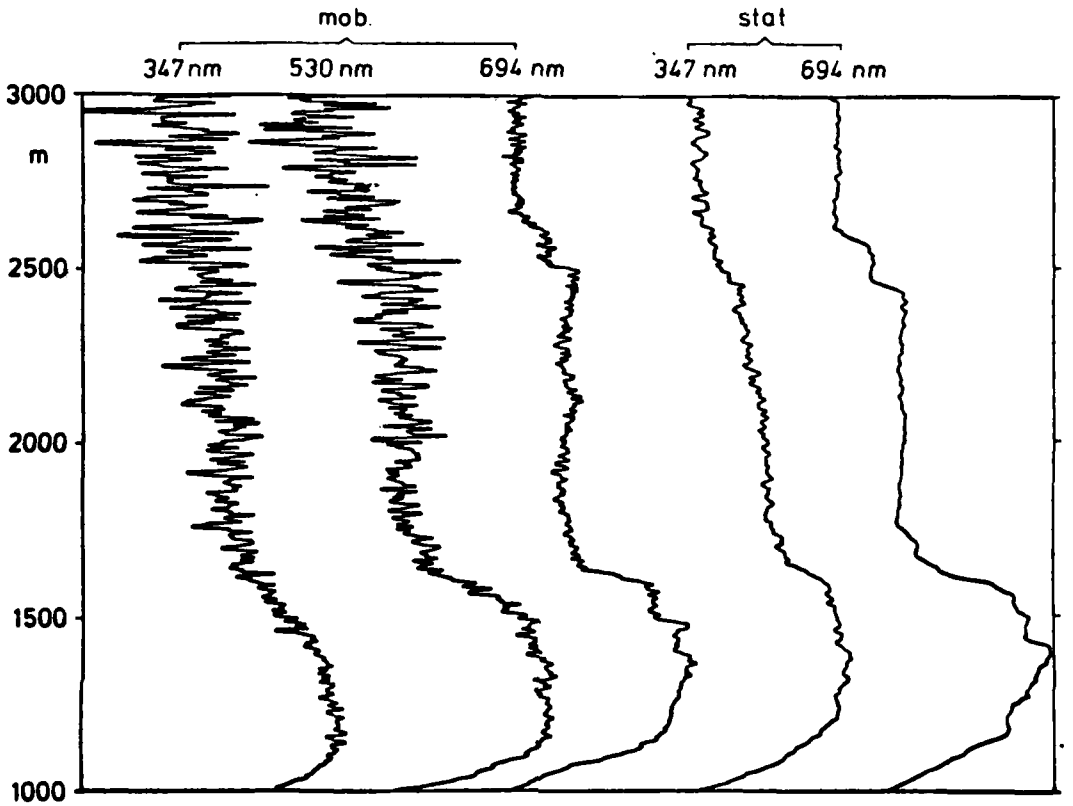
Especially after the electronic modification made by us on the sampling system, the Knollenberg particle spectrometer proved to be technically most useful to study over daily 24-hour periods the variations of the aerosol particle size distribution as a function of sea level and meteorological conditions. Examples of a first meteorological parameterization of data covering a time span of approximately one year are presented.

These provisional and still incomplete parameterizations show that the approach selected (improved Knollenberg particle size measuring technique, computer programs) is basically suitable for achieving reliable results. However, it is necessary to consider in the further program the following factors:

a) Additional aspects of parameterization in the future evaluations,

b) a much longer recording time as some months or one year for the acquisition of Knollenberg particle spectra since otherwise - owing to irregularities of weather, type of daily course (hourly means!), effect of seasons, and interannual variations - statements in conjunction with the basic problem cannot be made with the required statistical significance.

The comparison between rawinsonde ascents undertaken simultaneously at our station Garmisch and in Munich (Airport) shows in indirect way that our aerosol data are not materially influenced - apart from a few rare weather situations - by the presence of the mountains.



Relative Rückstreuintensität
REL. BACKSCATTER INTENSITY

Fig. 1

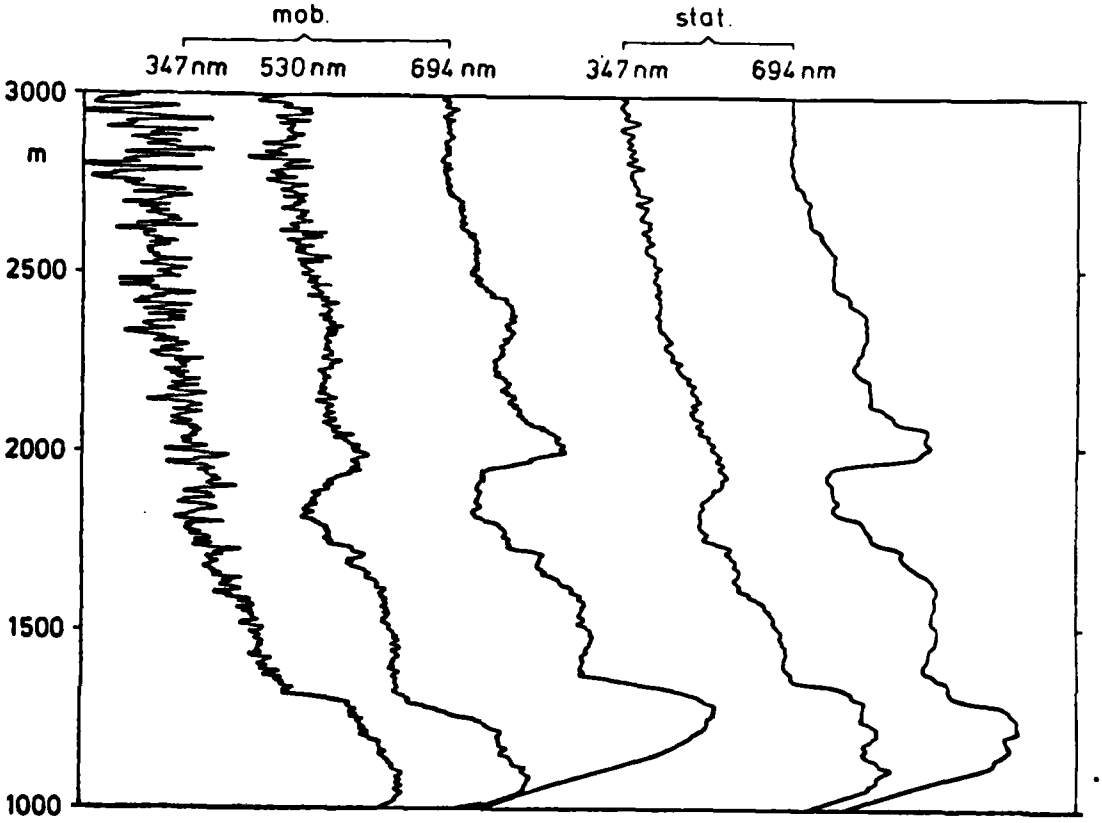

mob.
stat.
347nm
530nm
694nm
347nm
694nm
3000
m
2500
2000
1500
1000
Relative Rückstreuintensität
REL. BACKSCATTER INTENSITY

Fig. 2

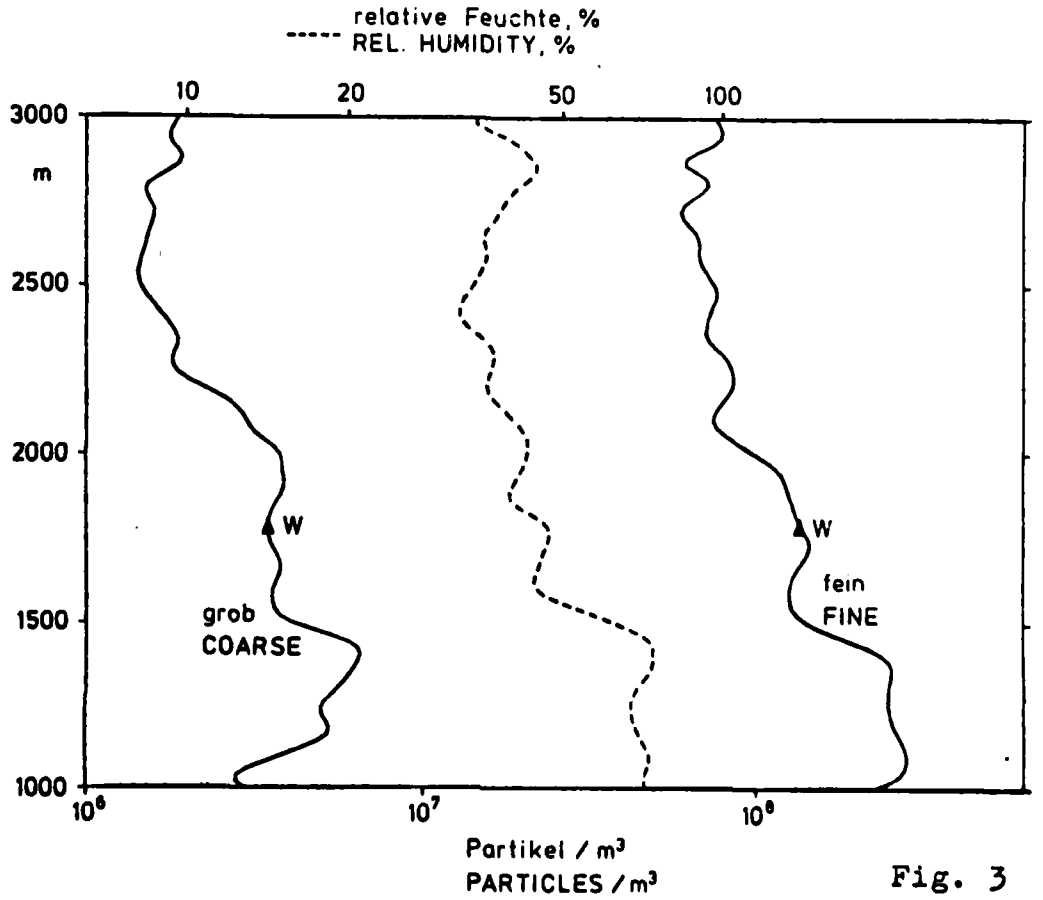

relative Feuchte, %
REL. HUMIDITY, %
10
20
50
100
3000
m
2500
2000
1500
1000
W
grob
COARSE
W
fein
FINE
10^6
10^7
10^8
Partikel / m³
PARTICLES / m³

Fig. 3

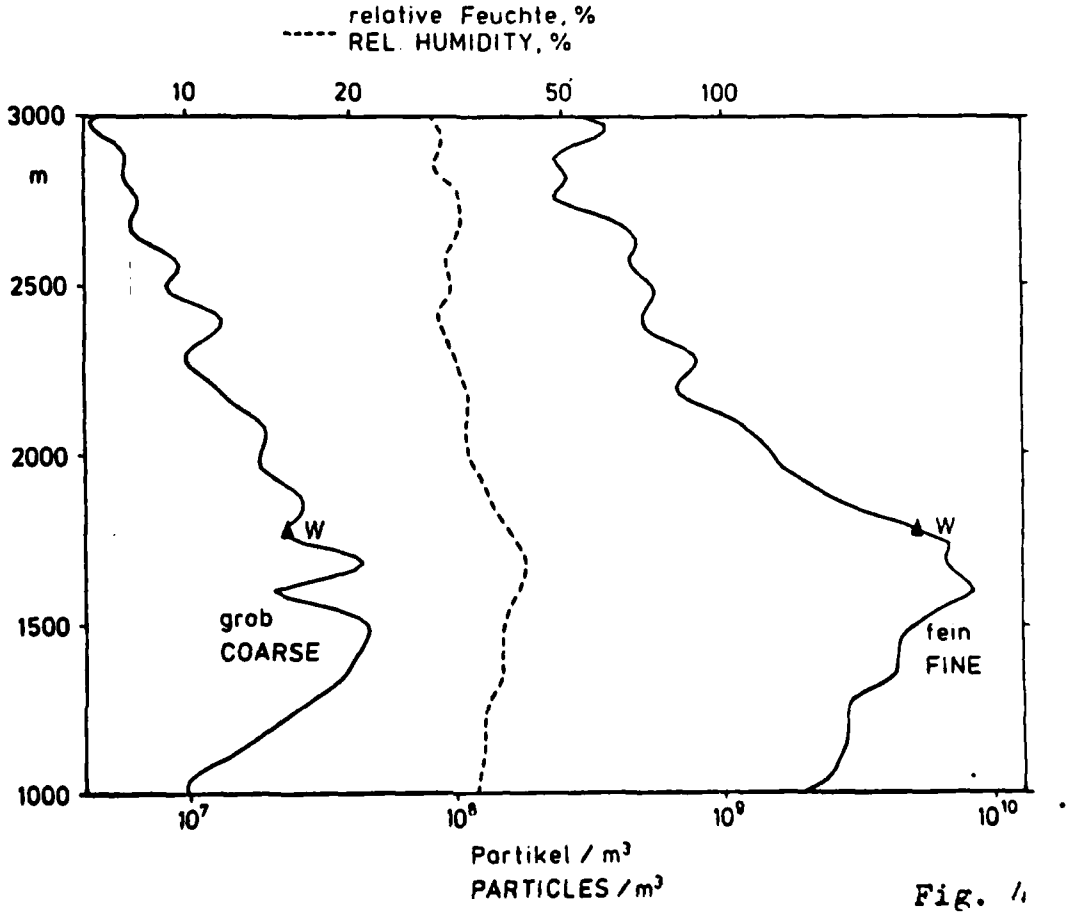

relative Feuchte, %
REL. HUMIDITY, %
10
20
50
100
3000
m
2500
2000
1500
1000
W
W
grob
COARSE
fein
FINE
10^7
10^8
10^9
10^{10}
Partikel / m³
PARTICLES / m³

Fig. 4

28 July 1970 – 15 Oct 1972 Ai 1000 Cases Fig. 5
1000 – 3000 m.a.s.l. Ai* 490 Cases
Inversions only

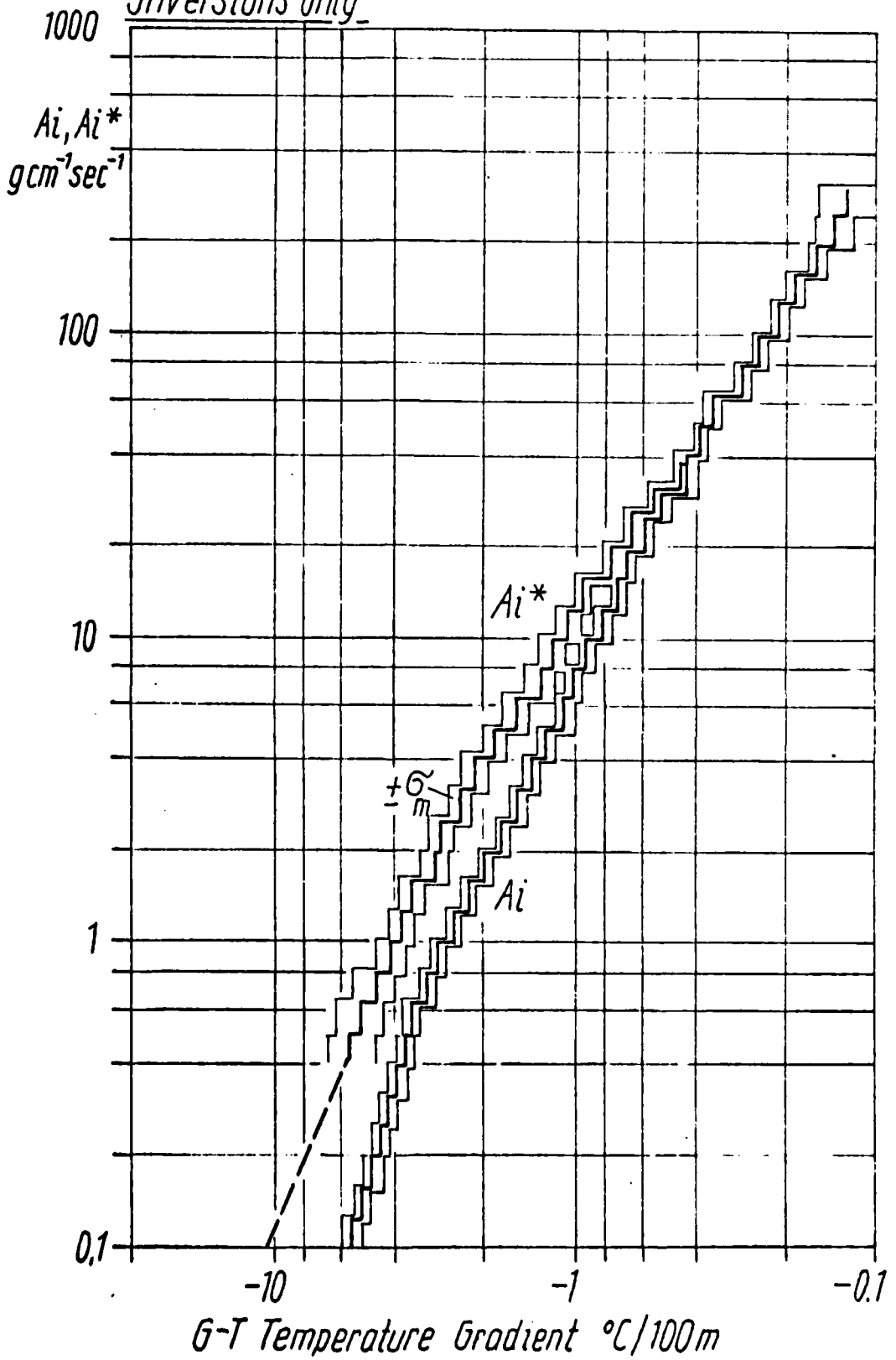
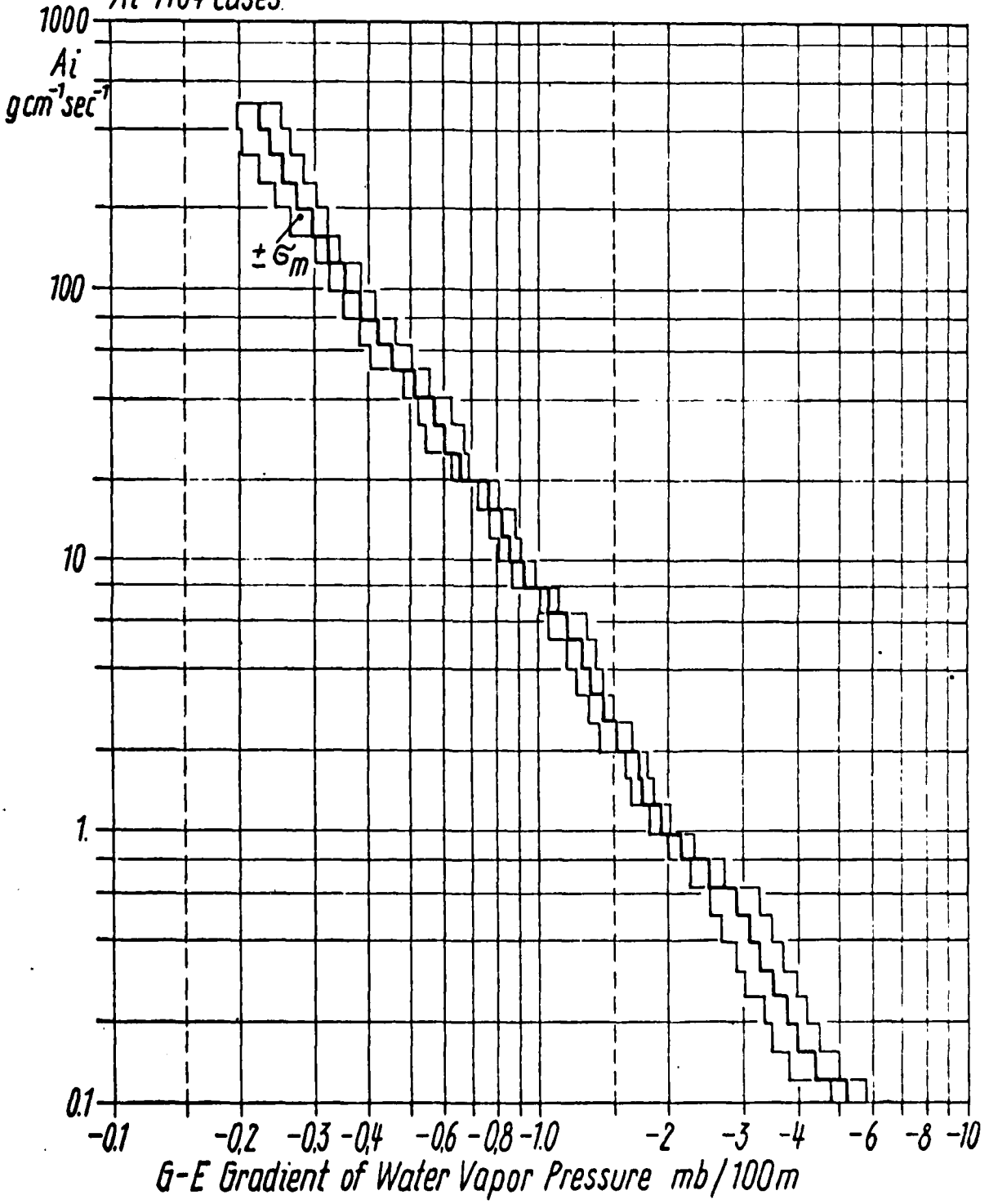


Fig. 6

28 July 1970 – 15 Oct 1972 1000 - 2000 m.a.s.l.

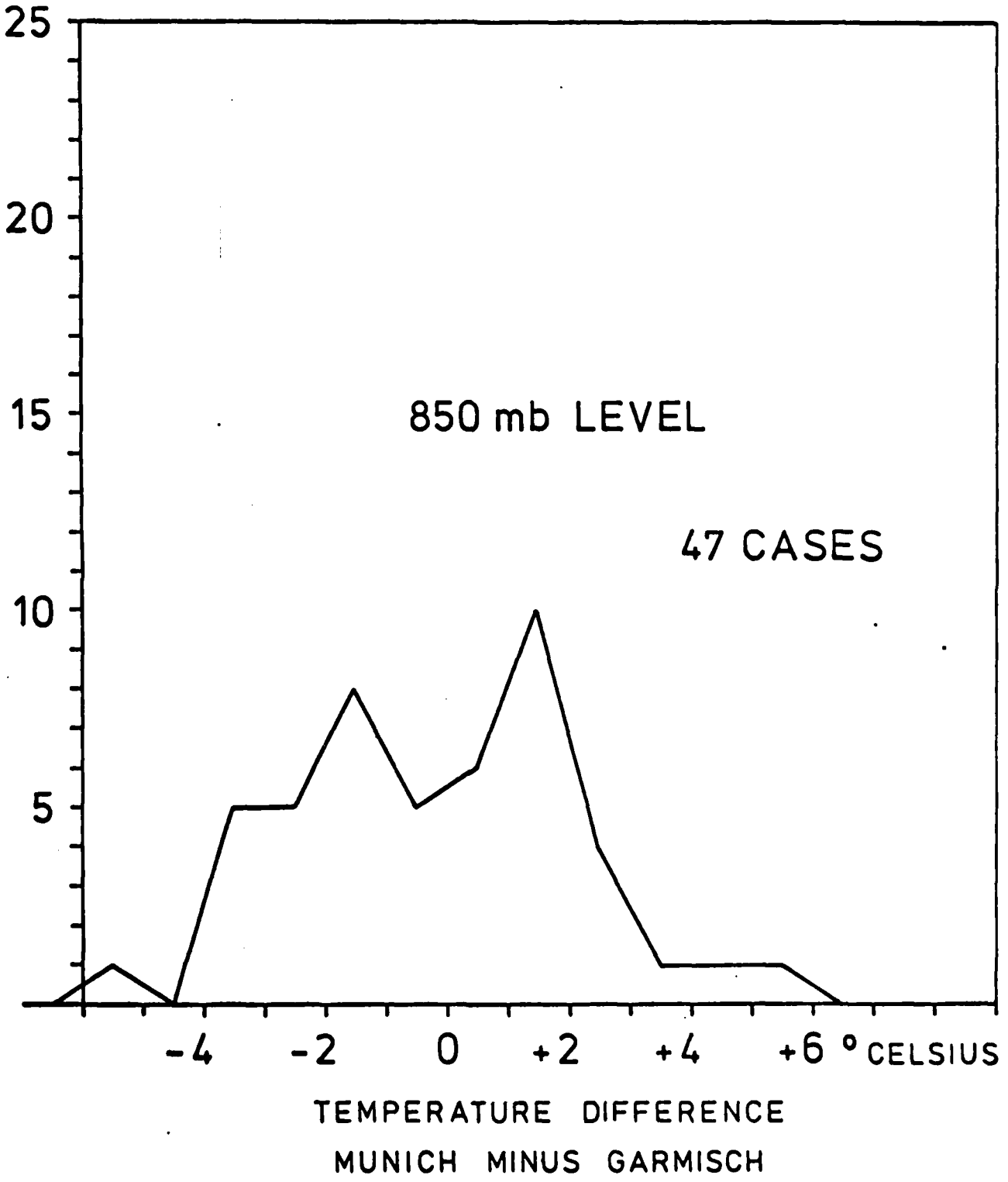
Inversions and other structures with minimum exchange

Ai 1164 Cases



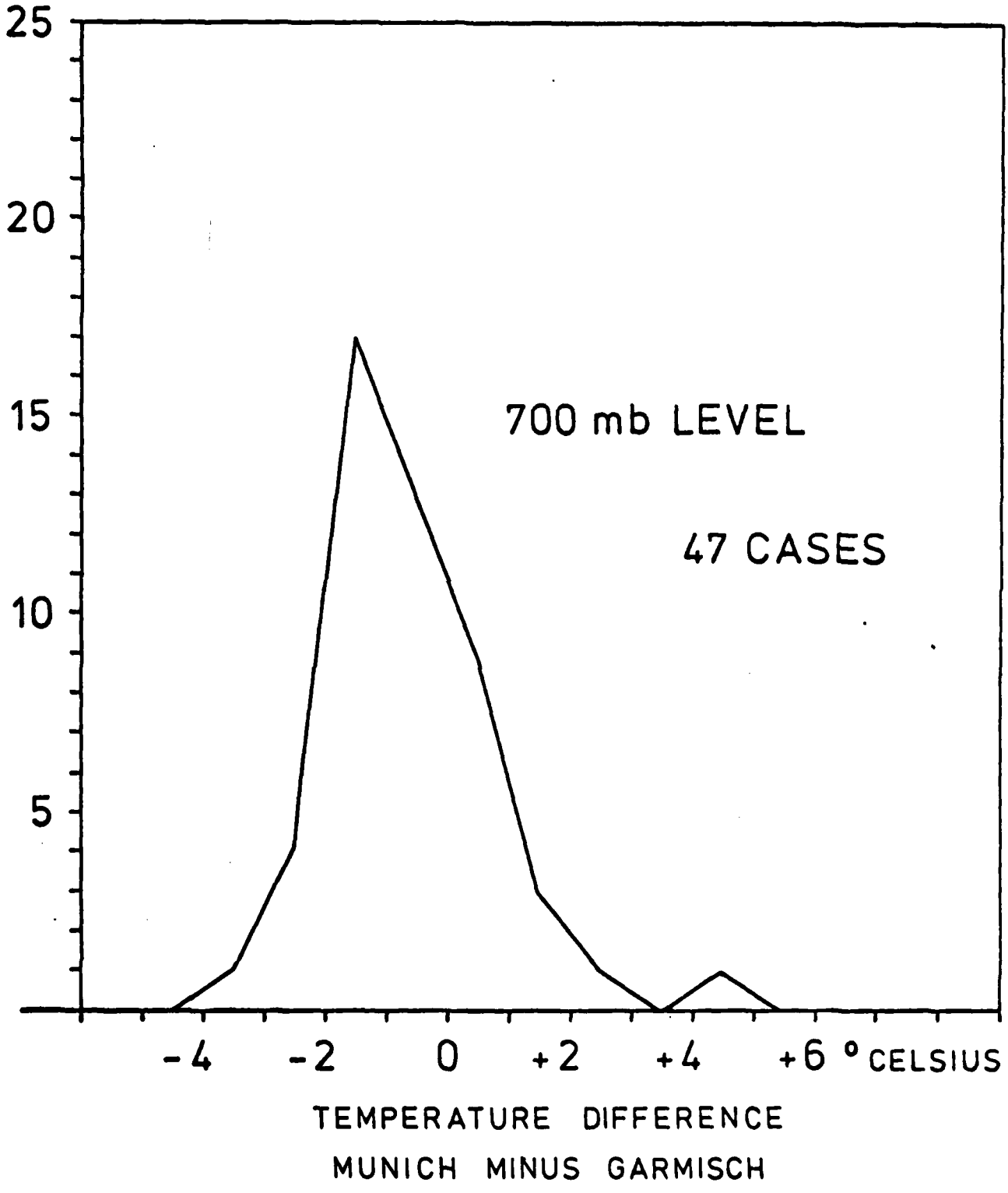
FREQUENCY
DISTRIBUTION

FIG. 7



FREQUENCY
DISTRIBUTION

FIG. 8



FREQUENCY
DISTRIBUTION

FIG. 9

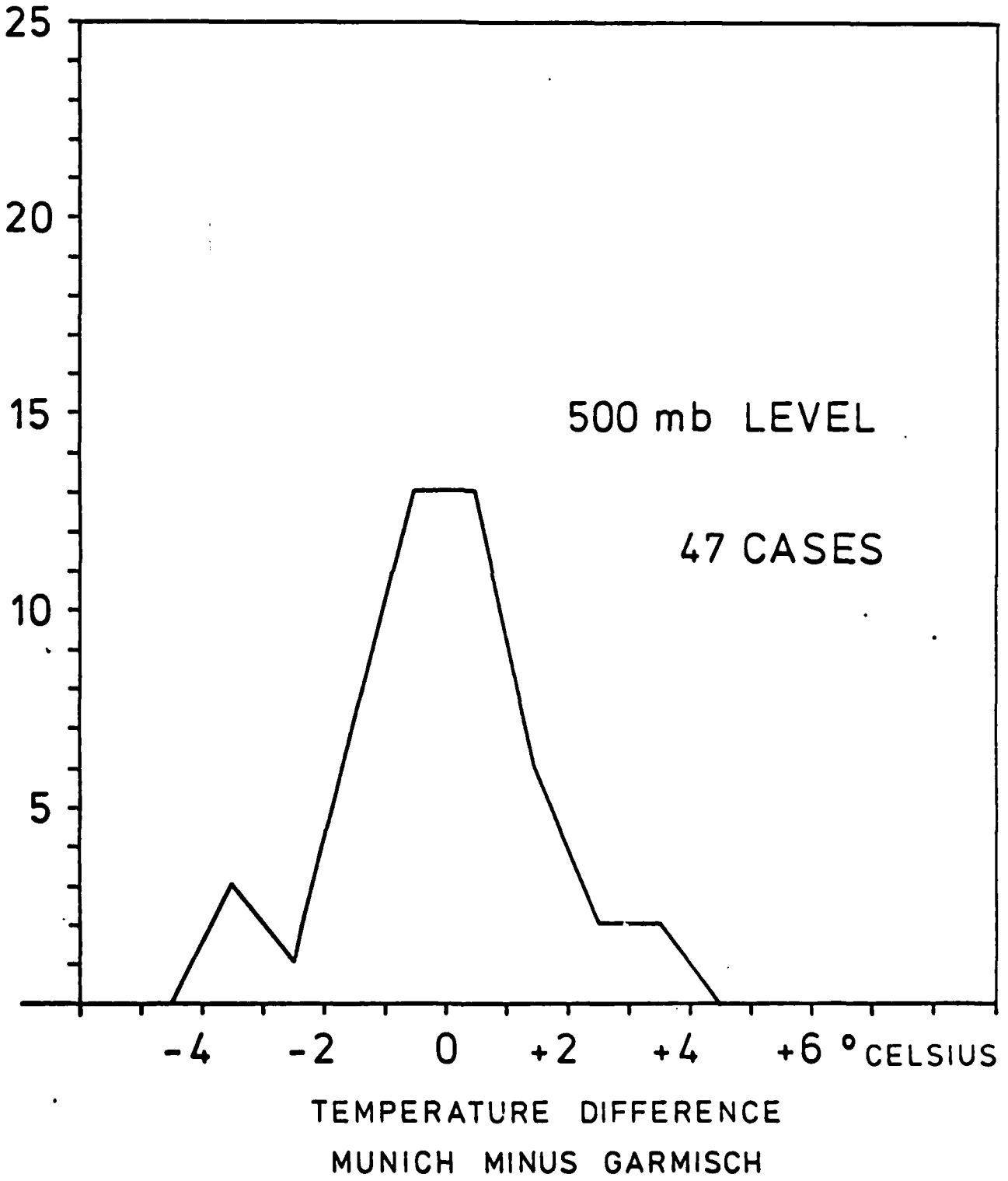


FIG. 10

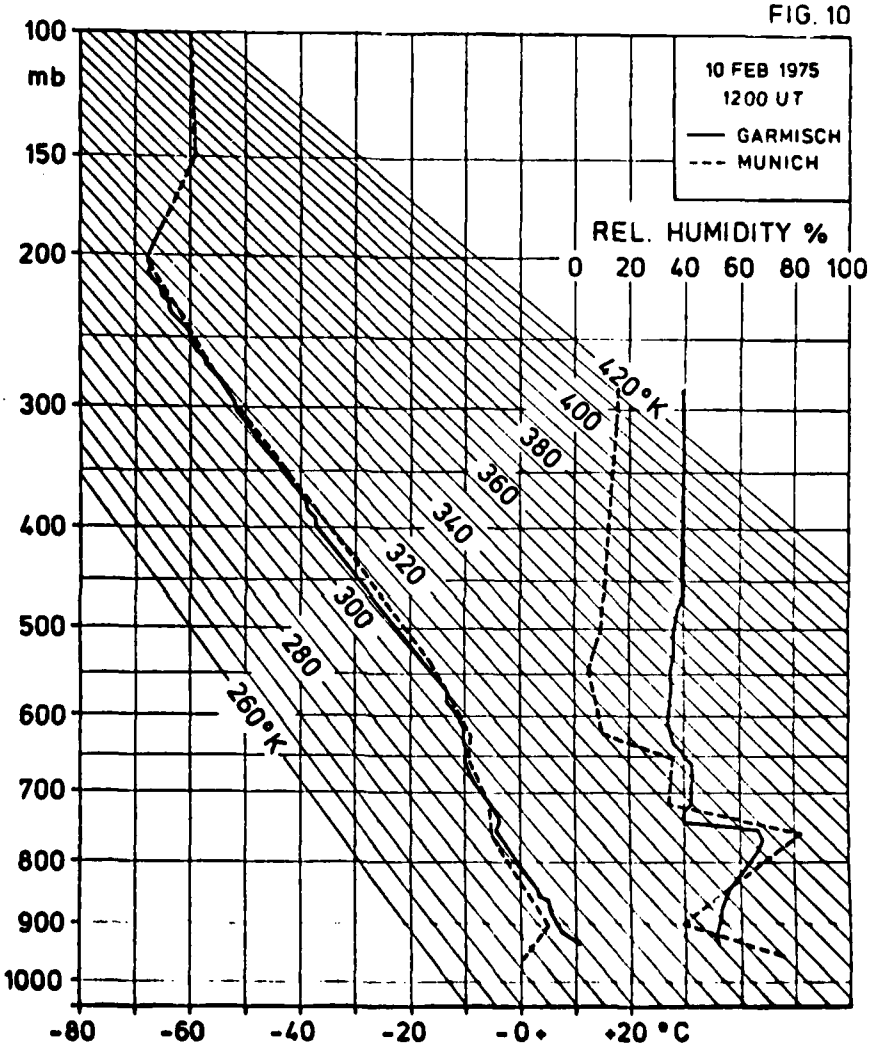

10 FEB 1975
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
500
600
700
800
900
1000
420°K
400
380
360
340
320
300
280
260°K
-80 -60 -40 -20 -0 +20 °C

FIG. 11

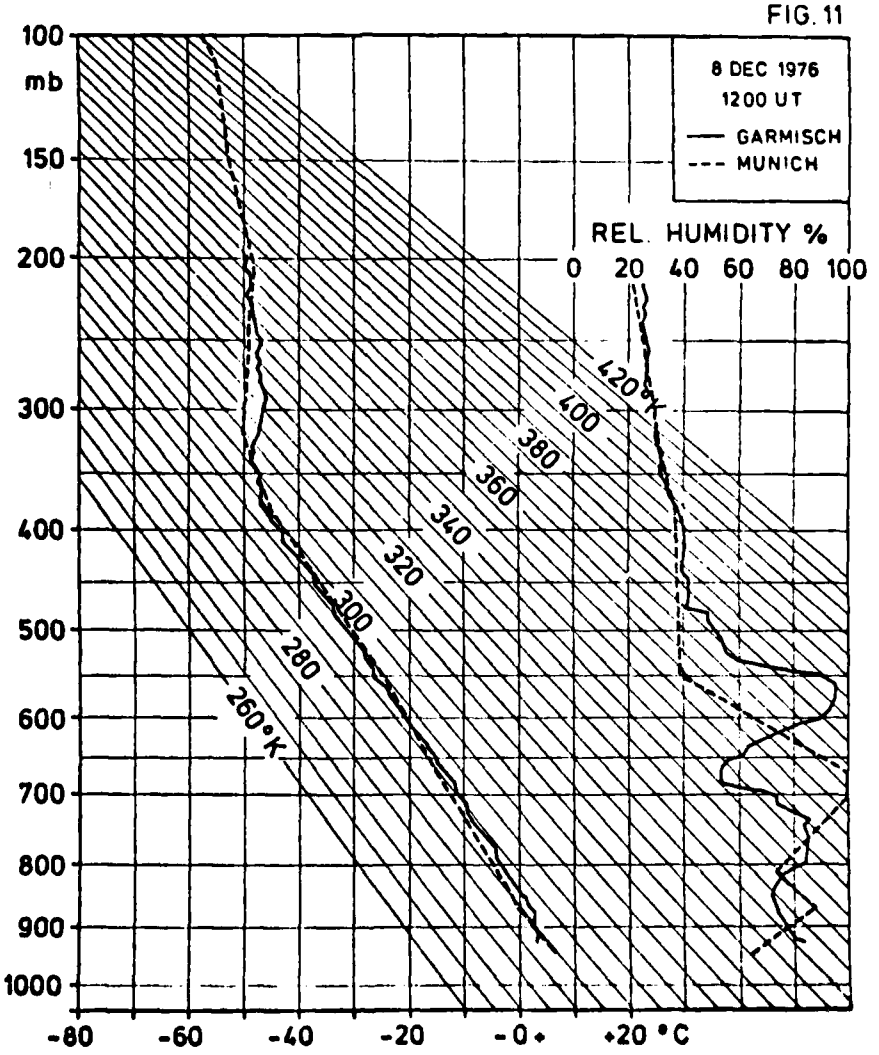

8 DEC 1976
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
500
600
700
800
900
1000
420°K
400
380
360
340
320
300
280
260°K
-80 -60 -40 -20 -0+ +20 °C

FIG. 12

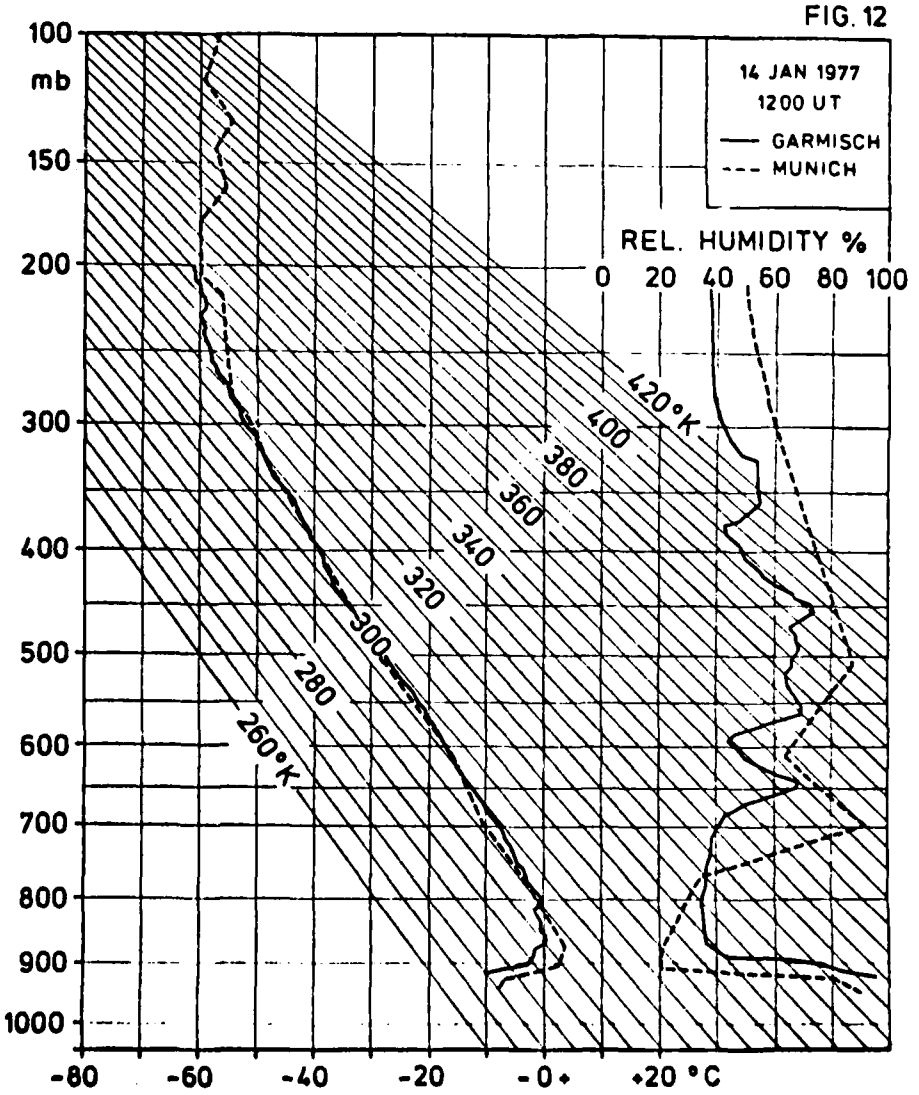

100
mb
150
200
300
400
500
600
700
800
900
1000
14 JAN 1977
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
420°K
400
380
360
340
320
300
280
260°K
-80 -60 -40 -20 -0+ +20 °C

FIG. 13

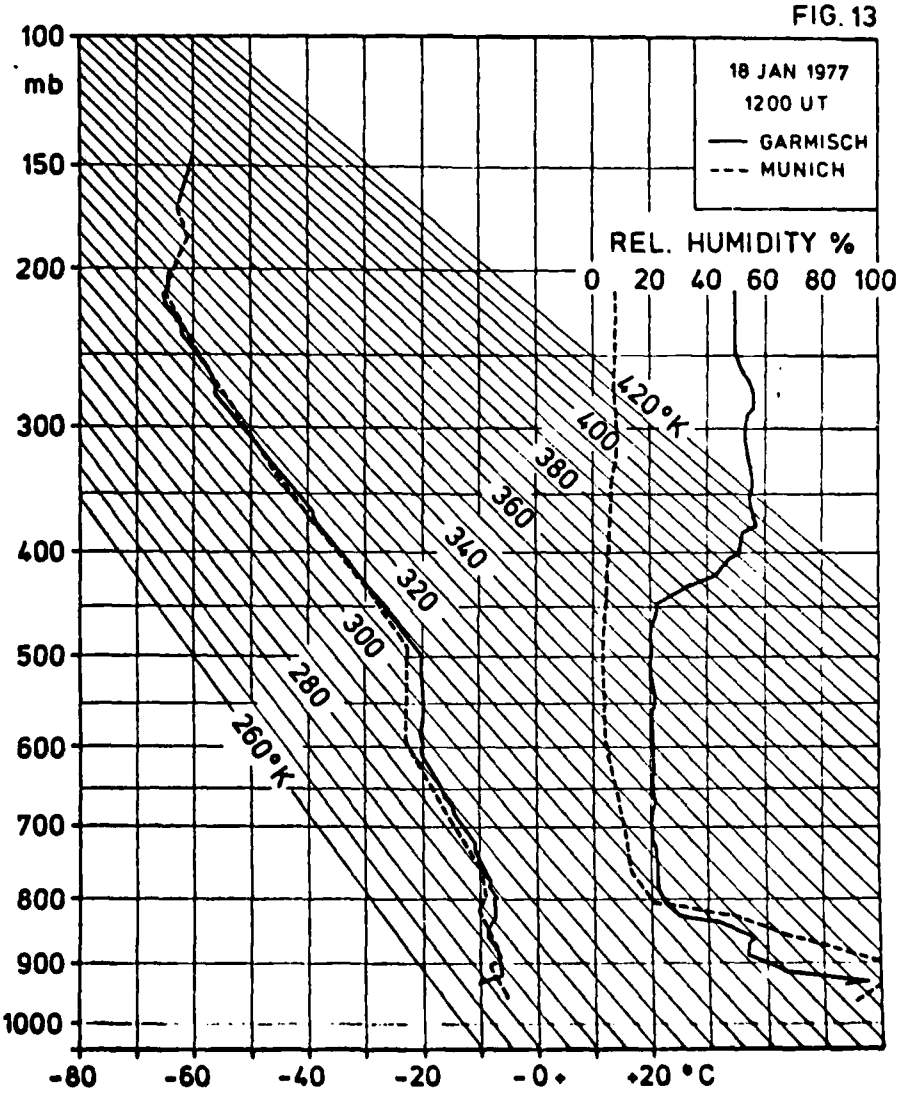

18 JAN 1977
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
500
600
700
800
900
1000
-80 -60 -40 -20 -0 +20 °C
420°K
400
380
360
340
320
300
280
260°K

FIG. 14

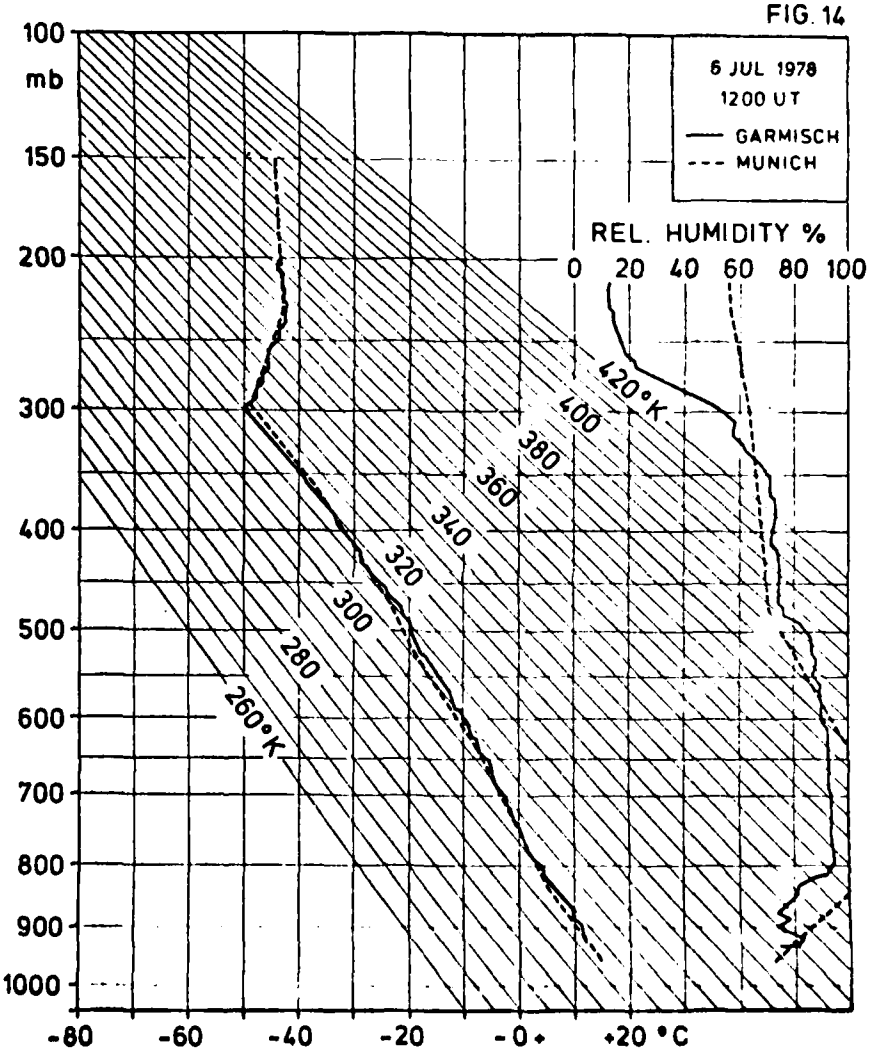

6 JUL 1978
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
500
600
700
800
900
1000
-80 -60 -40 -20 -0 +20 °C
420°K
400
380
360
340
320
300
280
260°K

FIG. 15

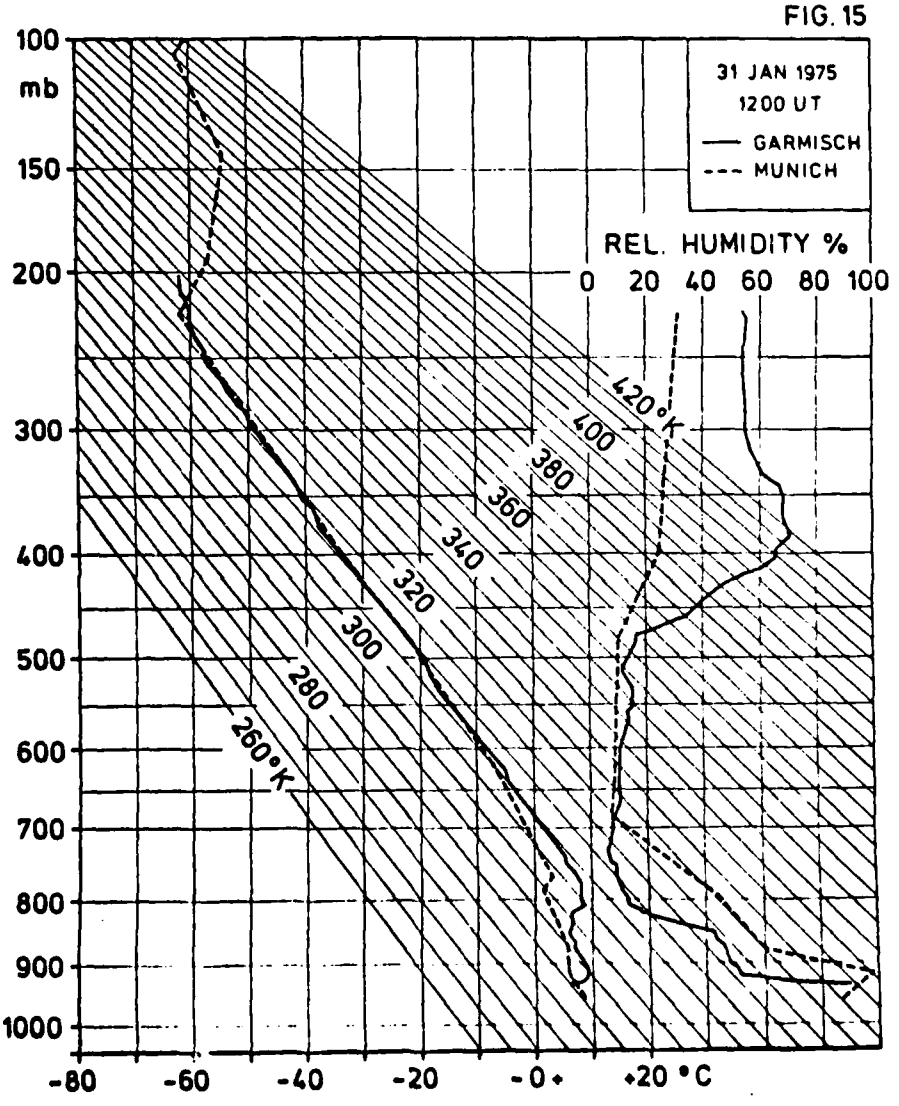

100
mb
150
200
300
400
500
600
700
800
900
1000
-80
-60
-40
-20
-0+
+20 °C
31 JAN 1975
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
420°K
400
380
360
340
320
300
280
260°K

FIG. 16

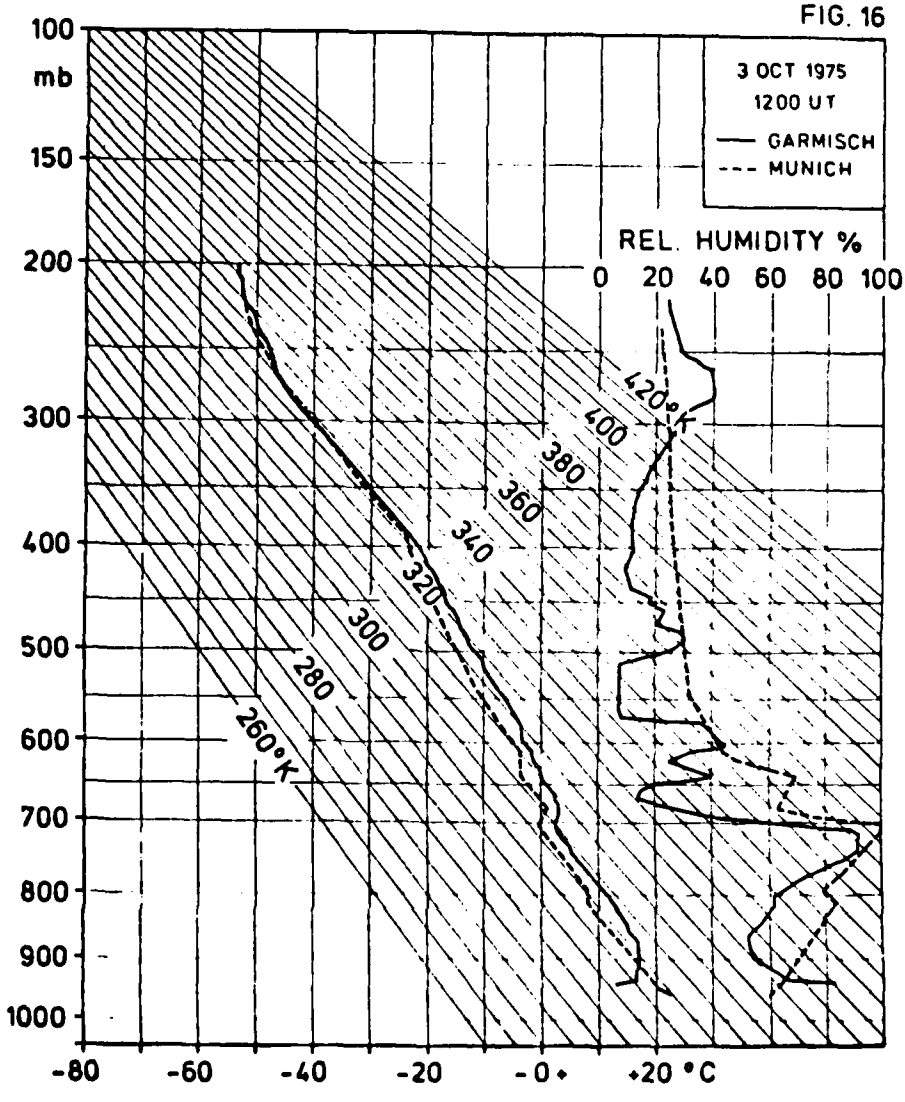
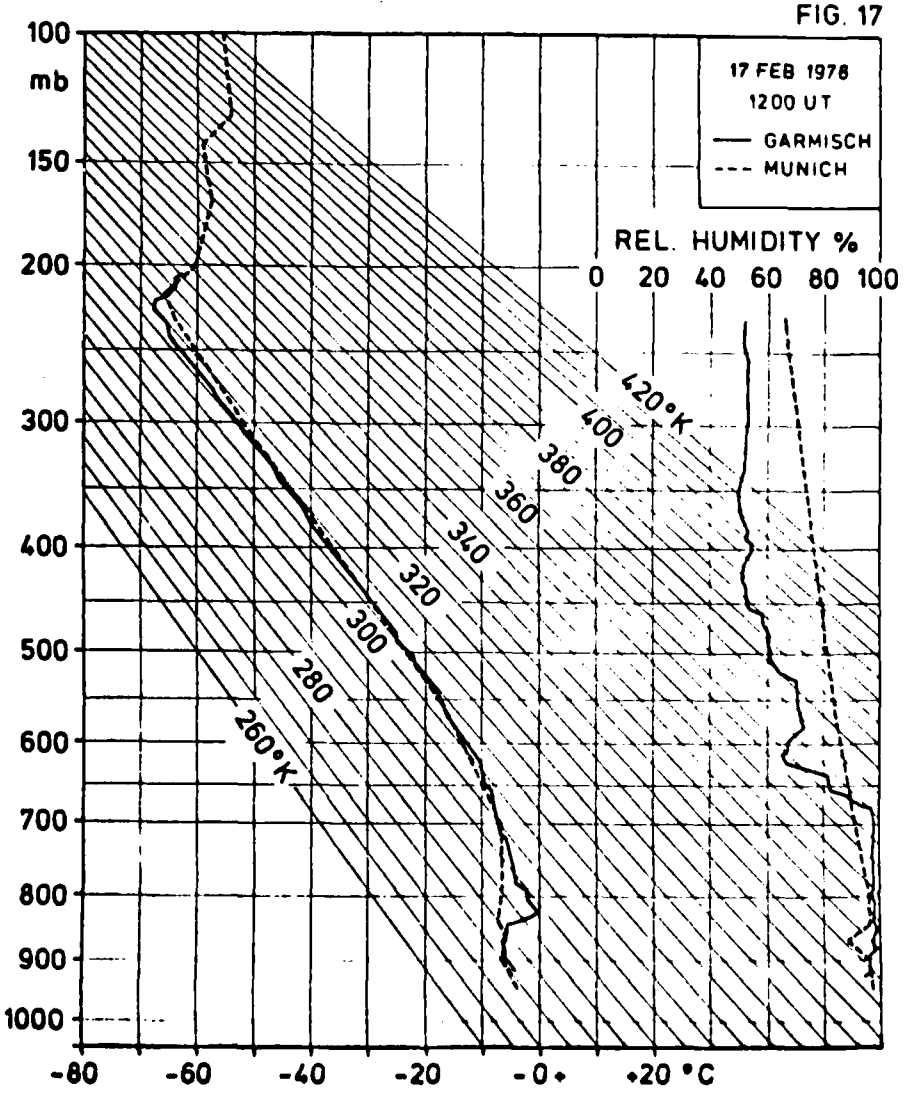

100
mb
150
200
300
400
500
600
700
800
900
1000
3 OCT 1975
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
420°K
400
380
360
340
320
300
280
260°K
-80 -60 -40 -20 -0 +20 °C

FIG. 17


17 FEB 1978
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
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600
700
800
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420°K
400
380
360
340
320
300
280
260°K
-80 -60 -40 -20 -0+ +20 °C

FIG. 18

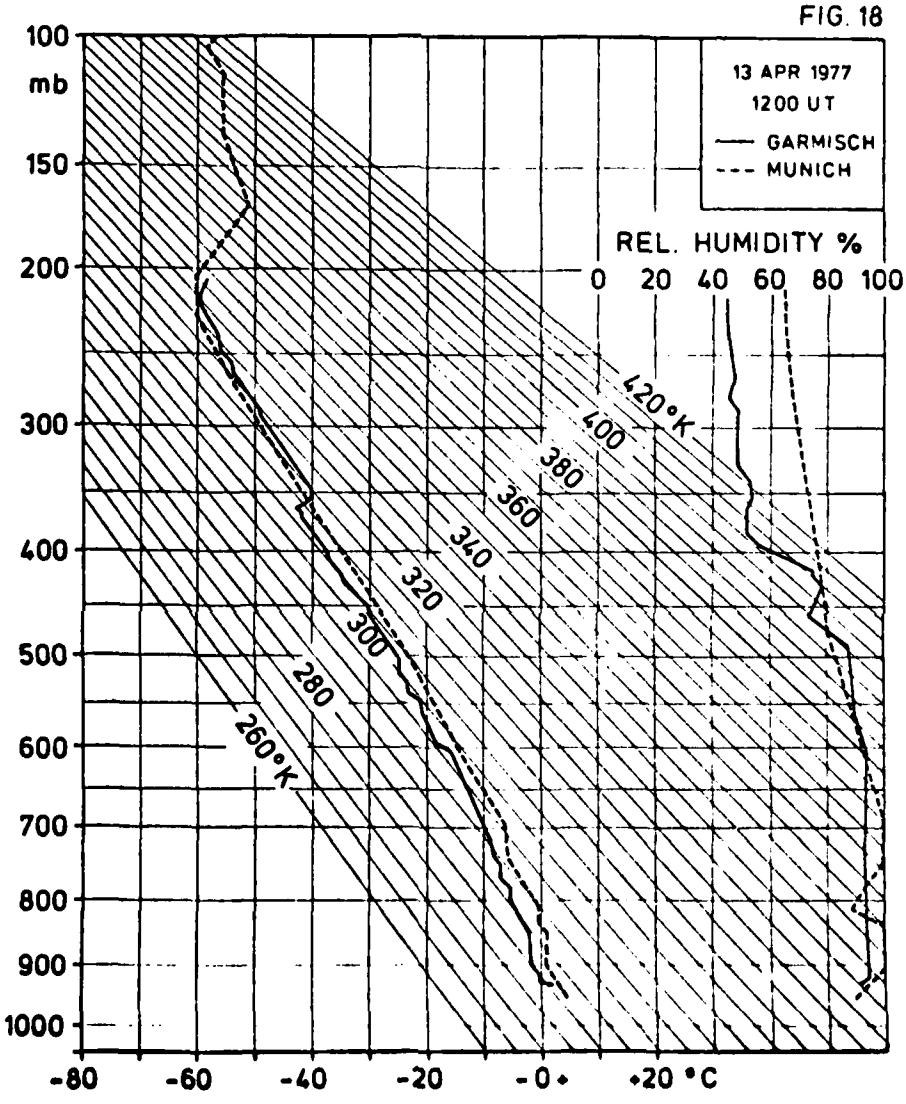
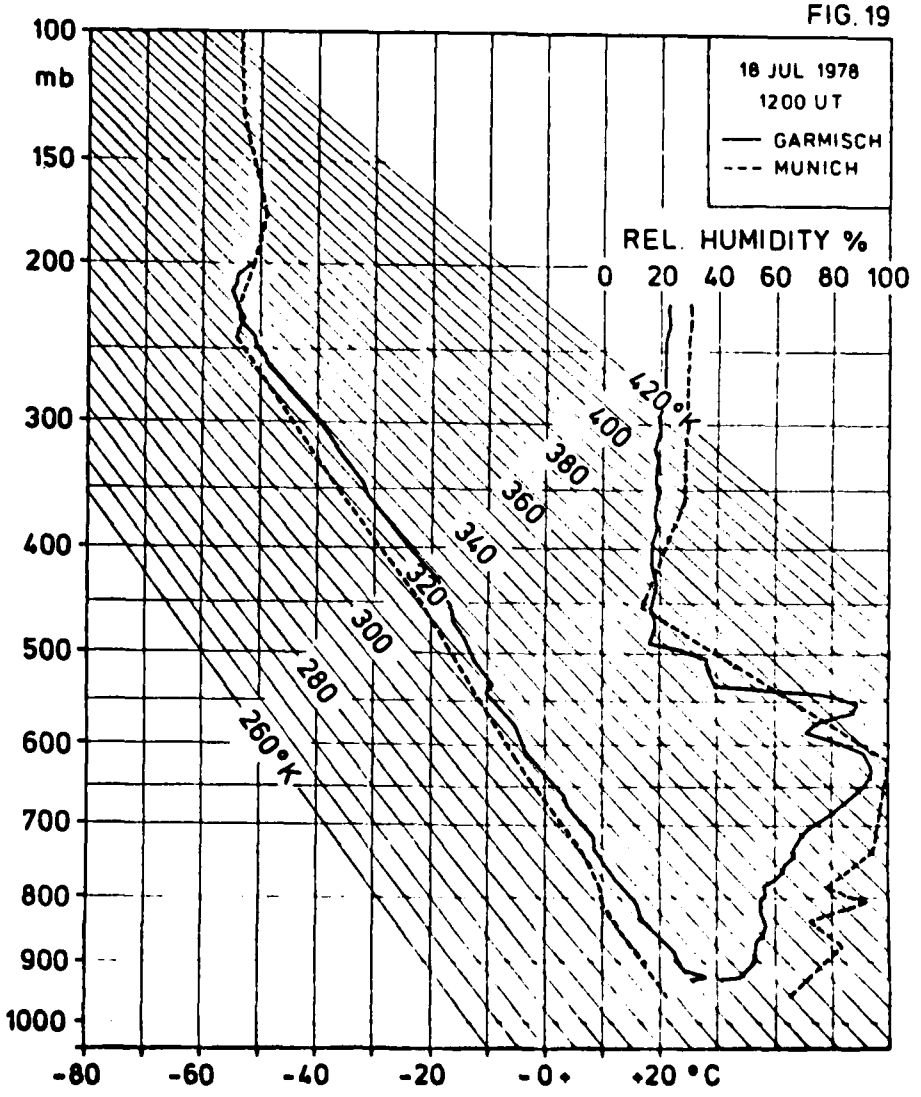

13 APR 1977
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
500
600
700
800
900
1000
420°K
400
380
360
340
320
300
280
260°K
-80 -60 -40 -20 -0 +20 °C

FIG. 19

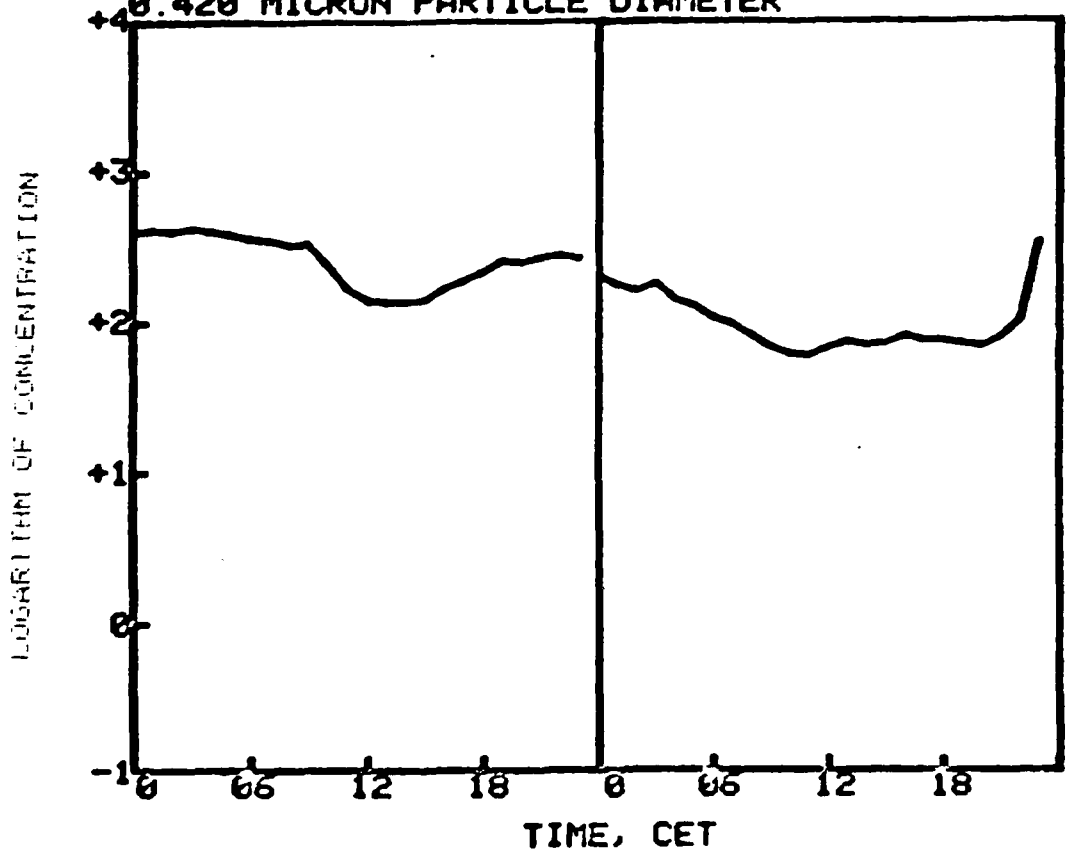

18 JUL 1978
1200 UT
GARMISCH
MUNICH
REL. HUMIDITY %
0 20 40 60 80 100
100
mb
150
200
300
400
500
600
700
800
900
1000
-80 -60 -40 -20 -0+ +20 °C
420°K
400
380
360
340
320
300
280
260°K

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

0.420 MICRON PARTICLE DIAMETER



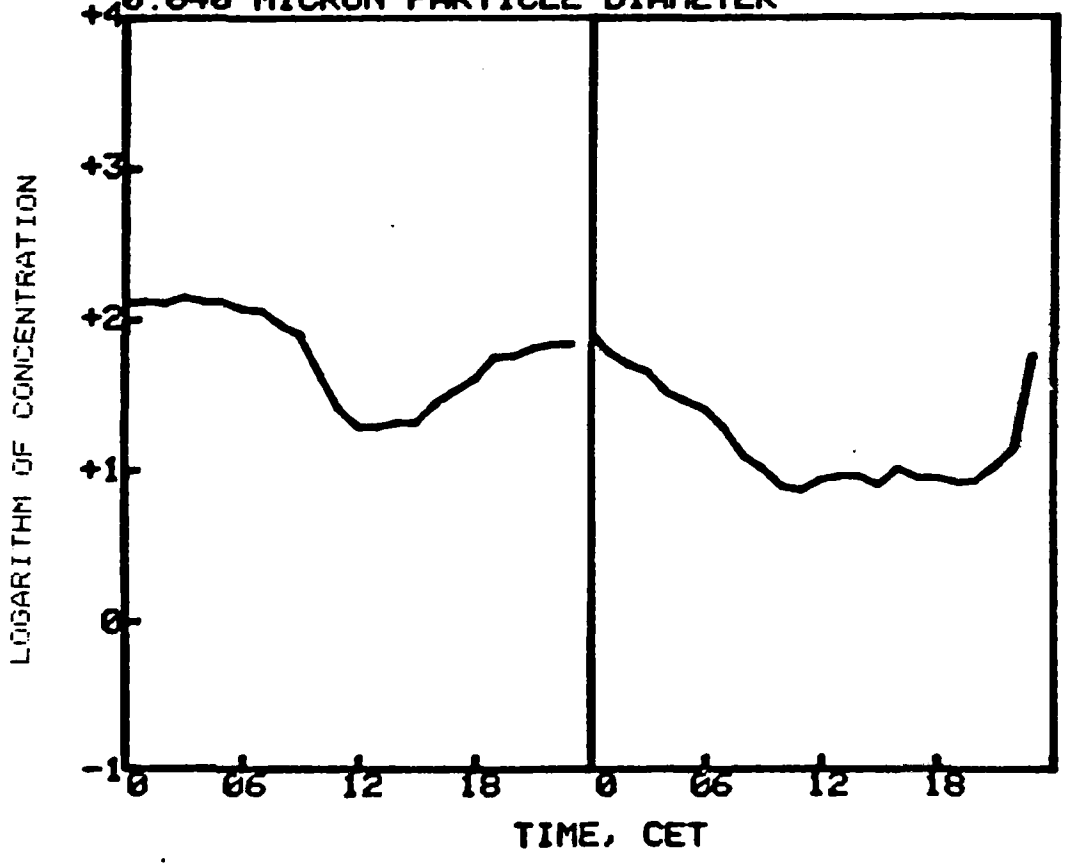
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

0.640 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

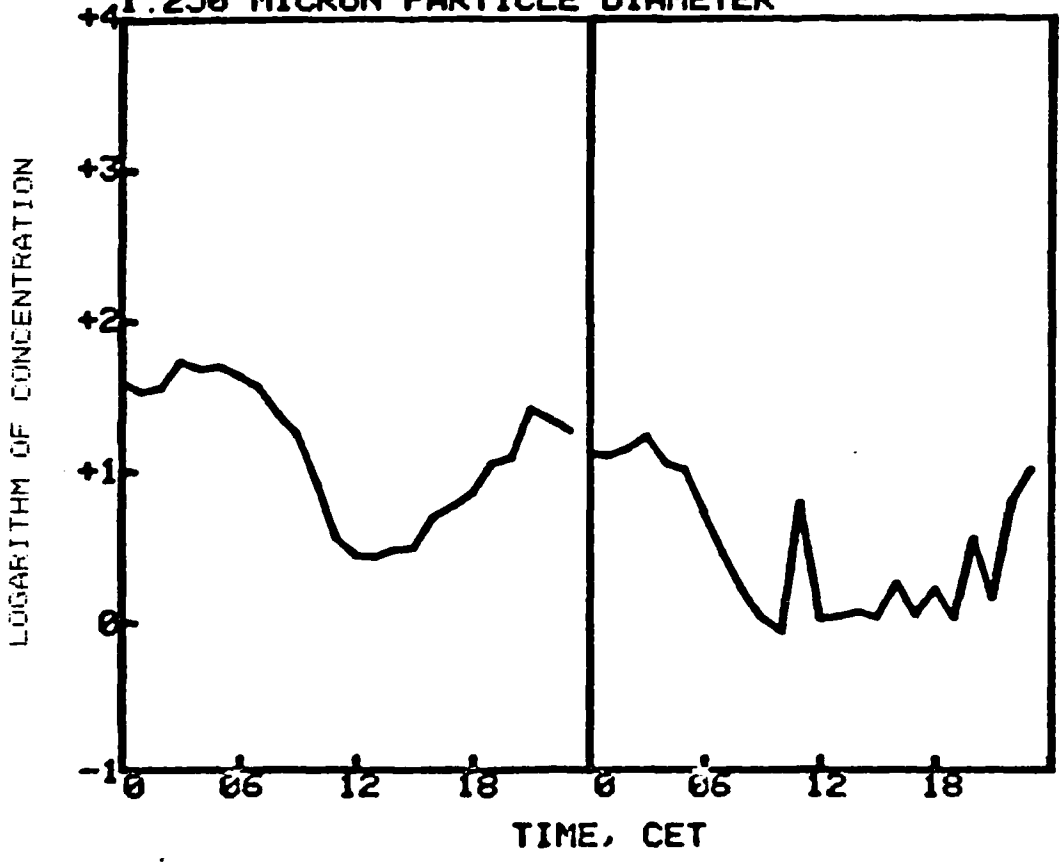
PLOT: 1.2

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

1.250 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

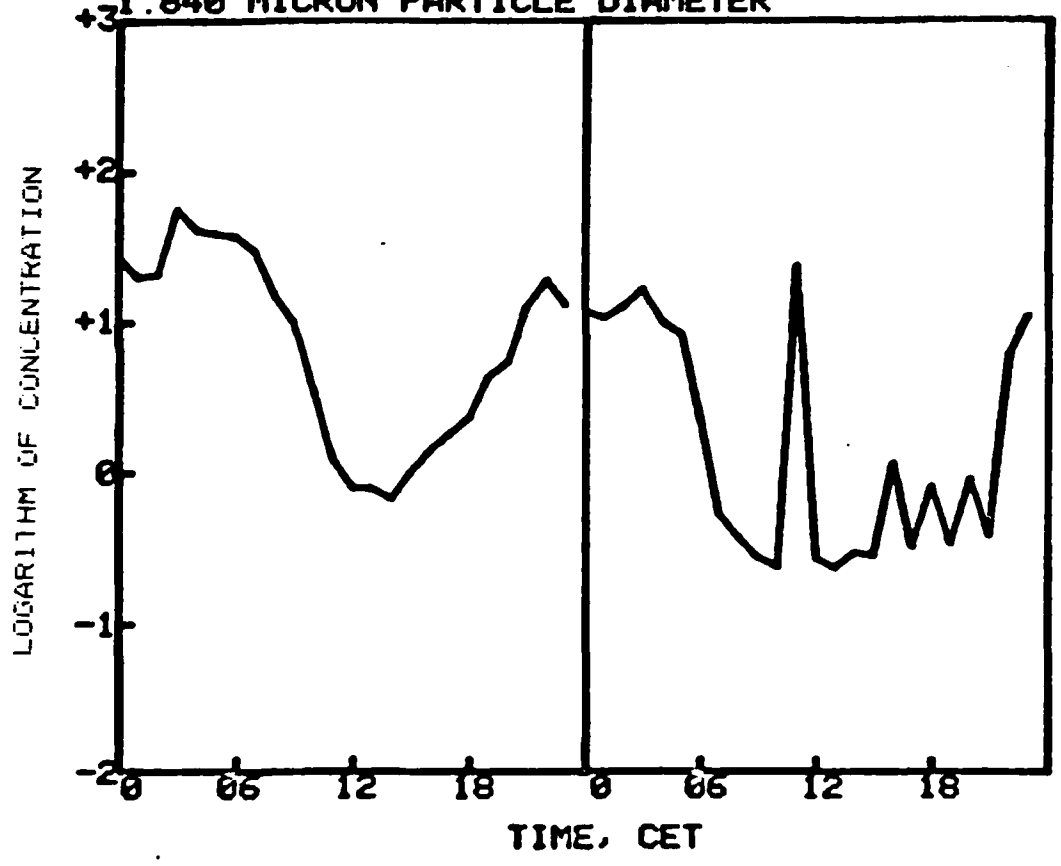
FIG. 1.3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

1.840 MICRON PARTICLE DIAMETER



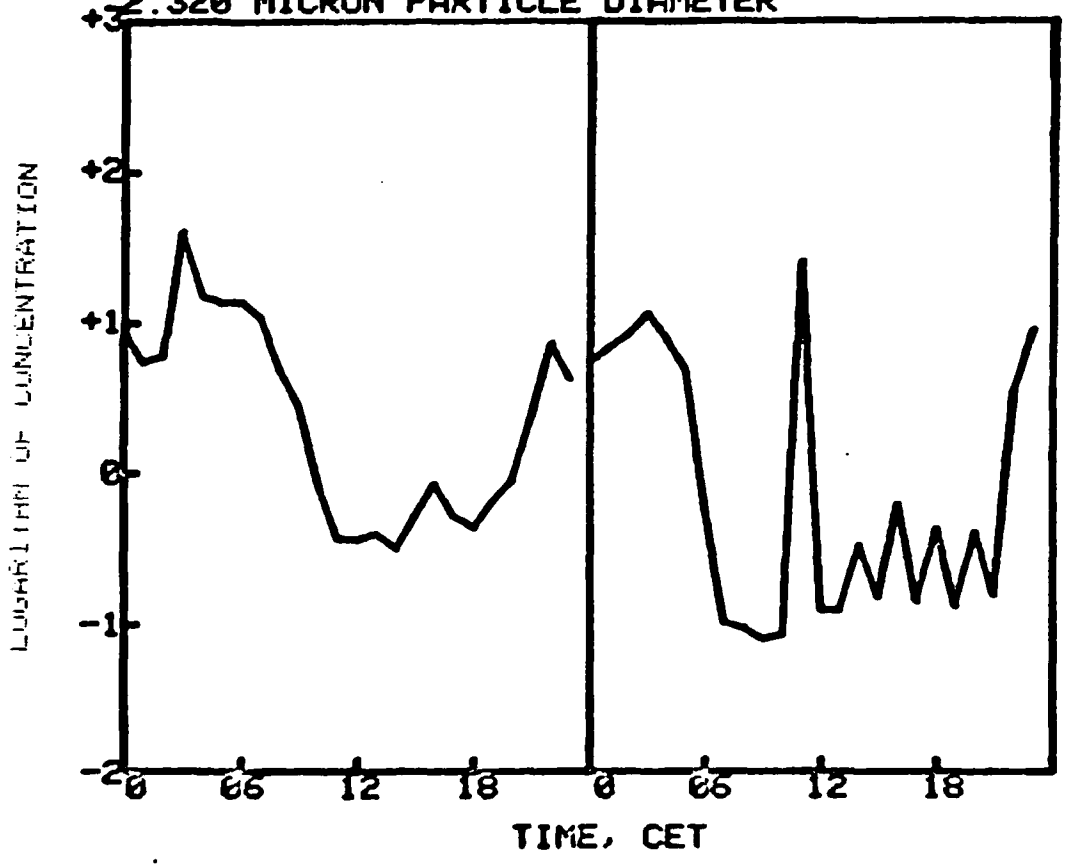
GARMISCH, 740 M WANK, 1783 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

2.320 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

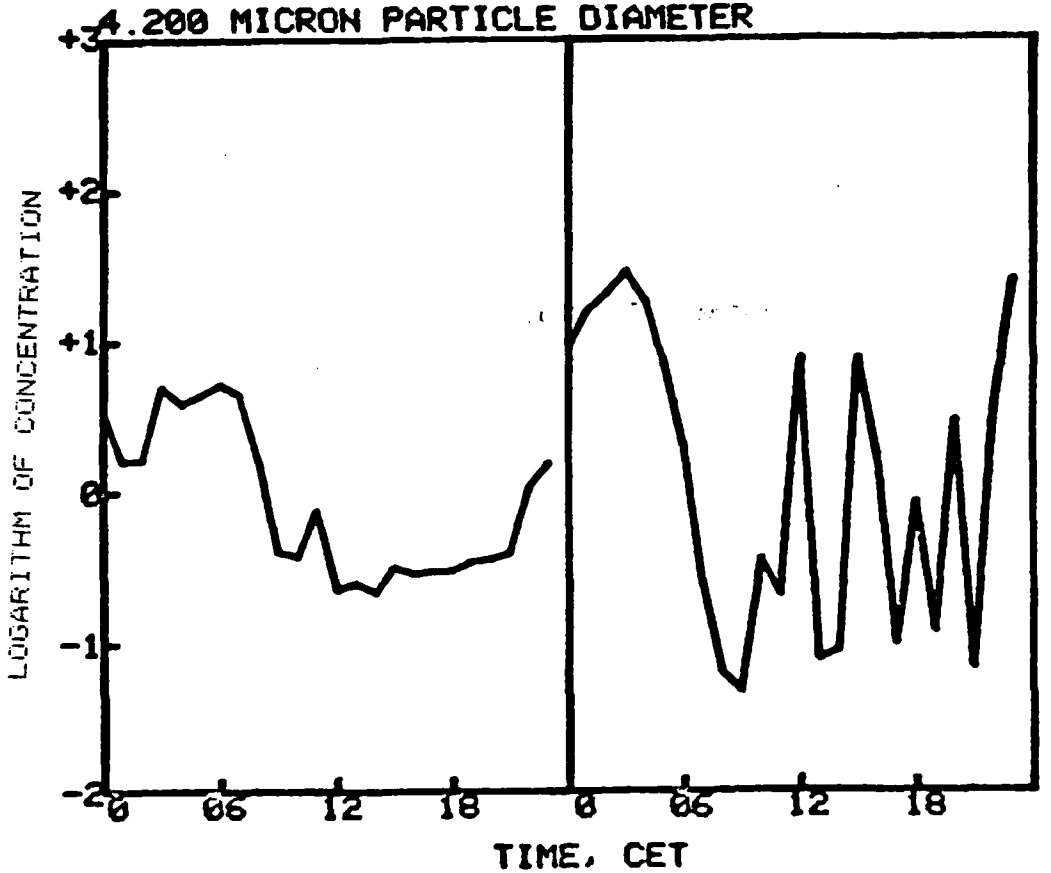
FIG. 1.5

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

4.200 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

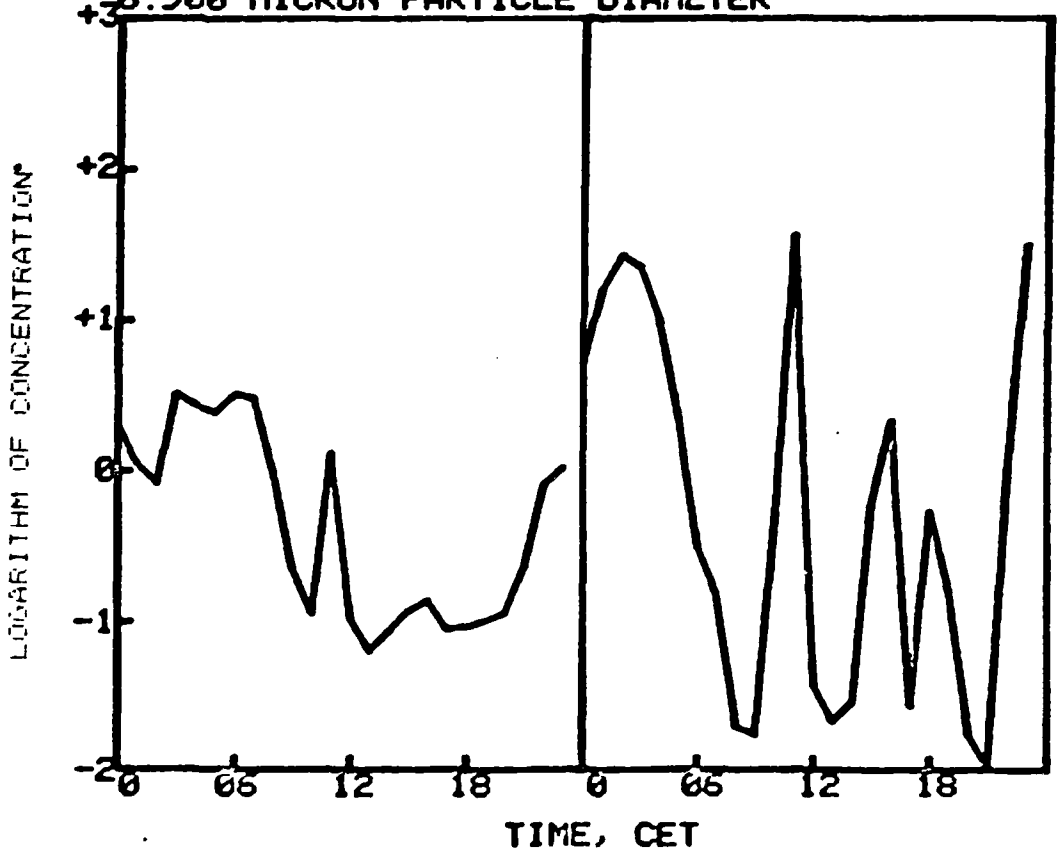
PLOT: 1.

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

6.900 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

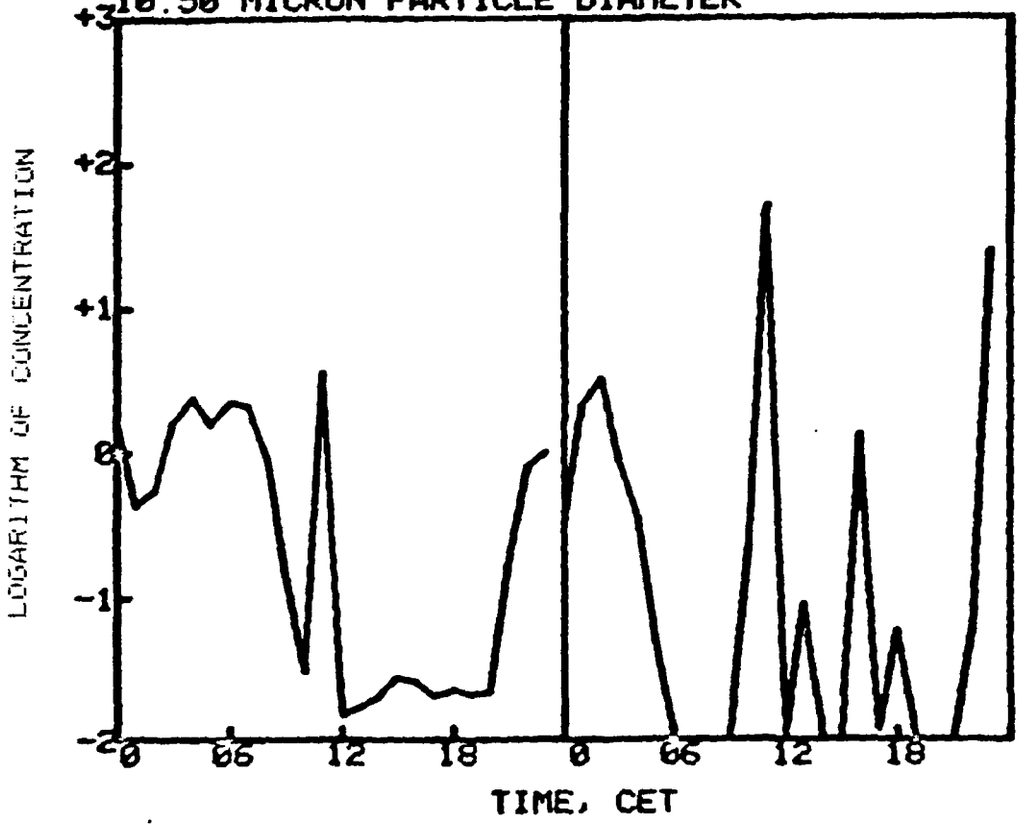
PLOT 1 7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

10.50 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

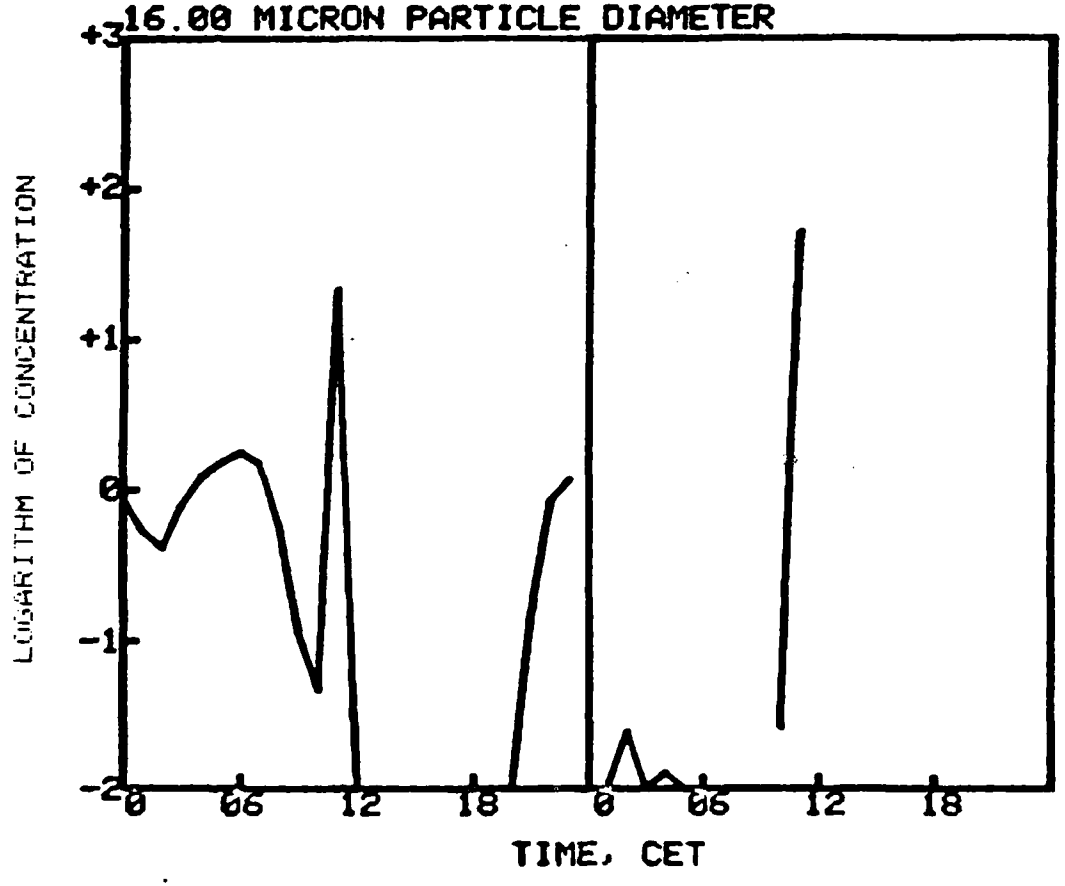
FLUG 1.8

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.DURATION OF SUNSHINE=100%

0033 DAYS; STATION: WANK AND GARMISH (24)

16.00 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

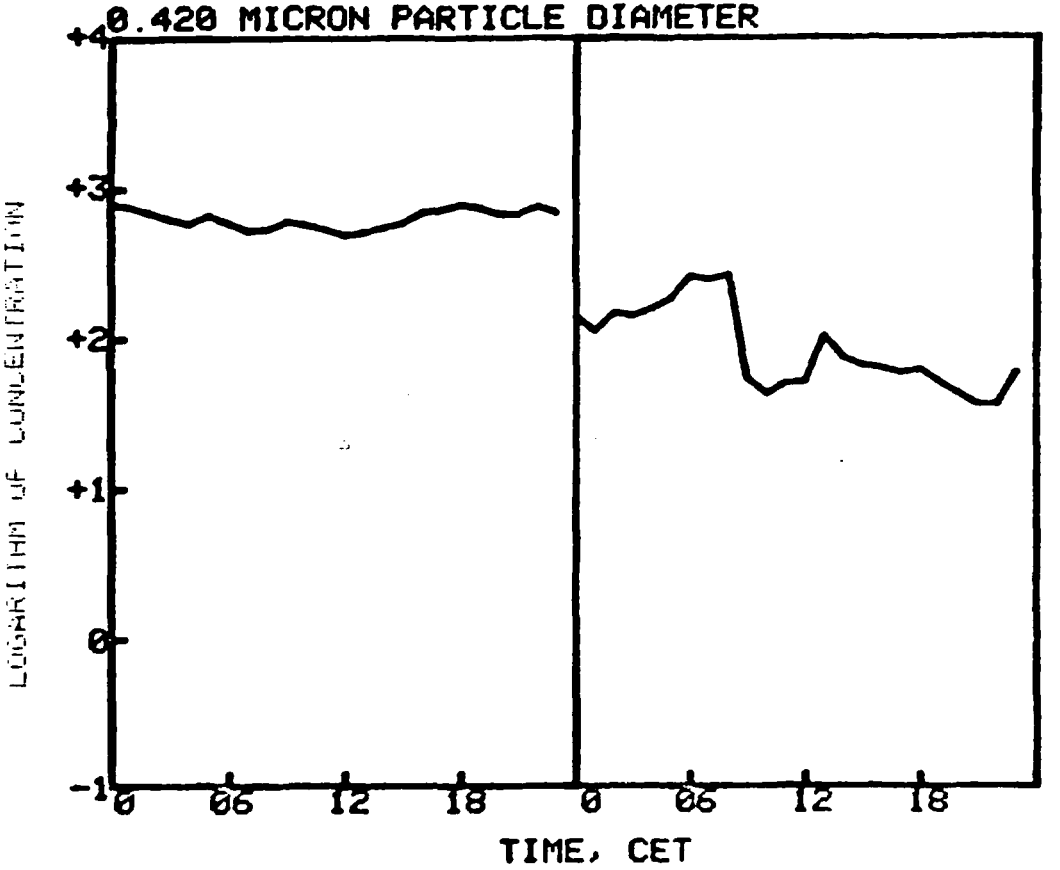
PLOT: 1 9

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

0.420 MICRON PARTICLE DIAMETER



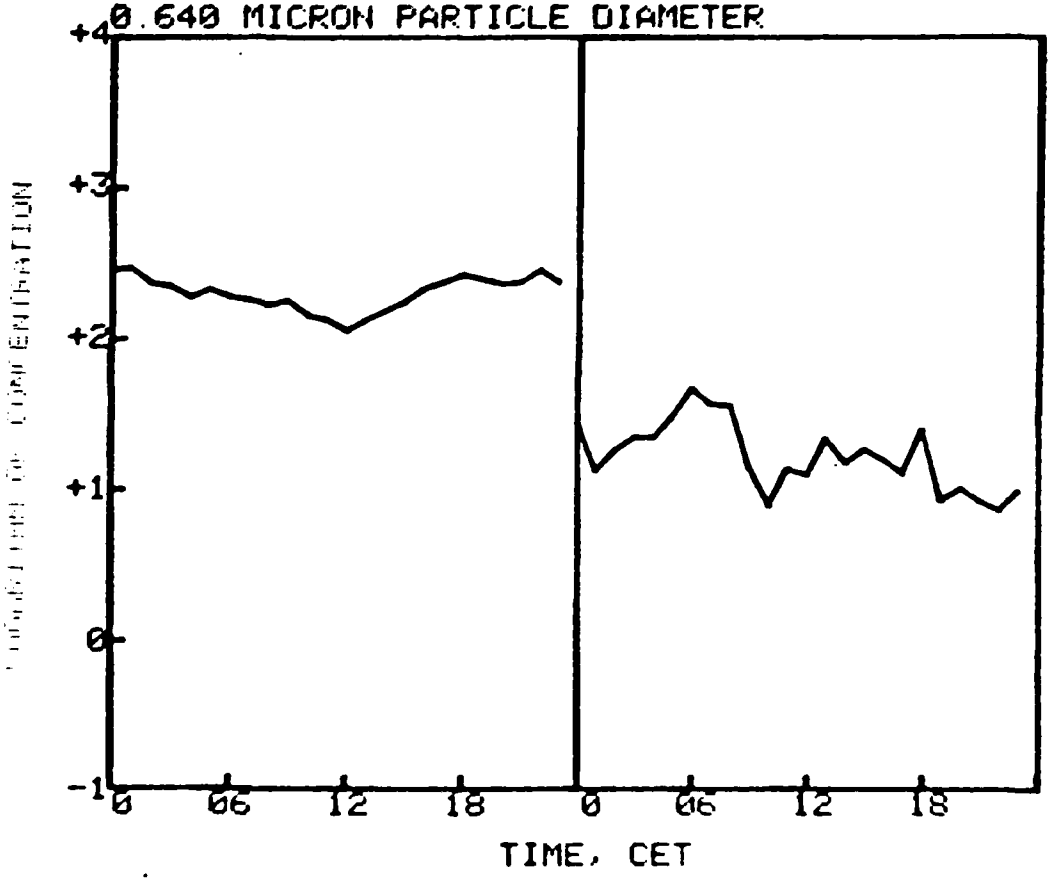
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

0.640 MICRON PARTICLE DIAMETER



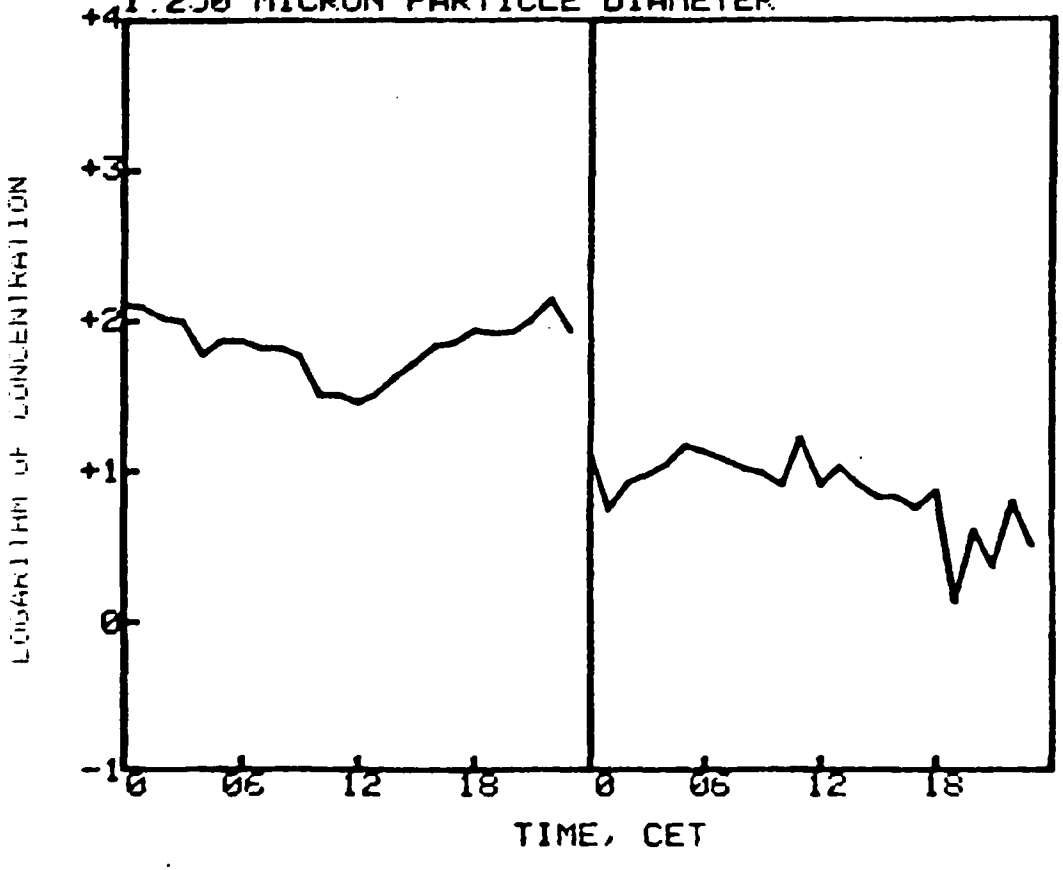
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

1.250 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

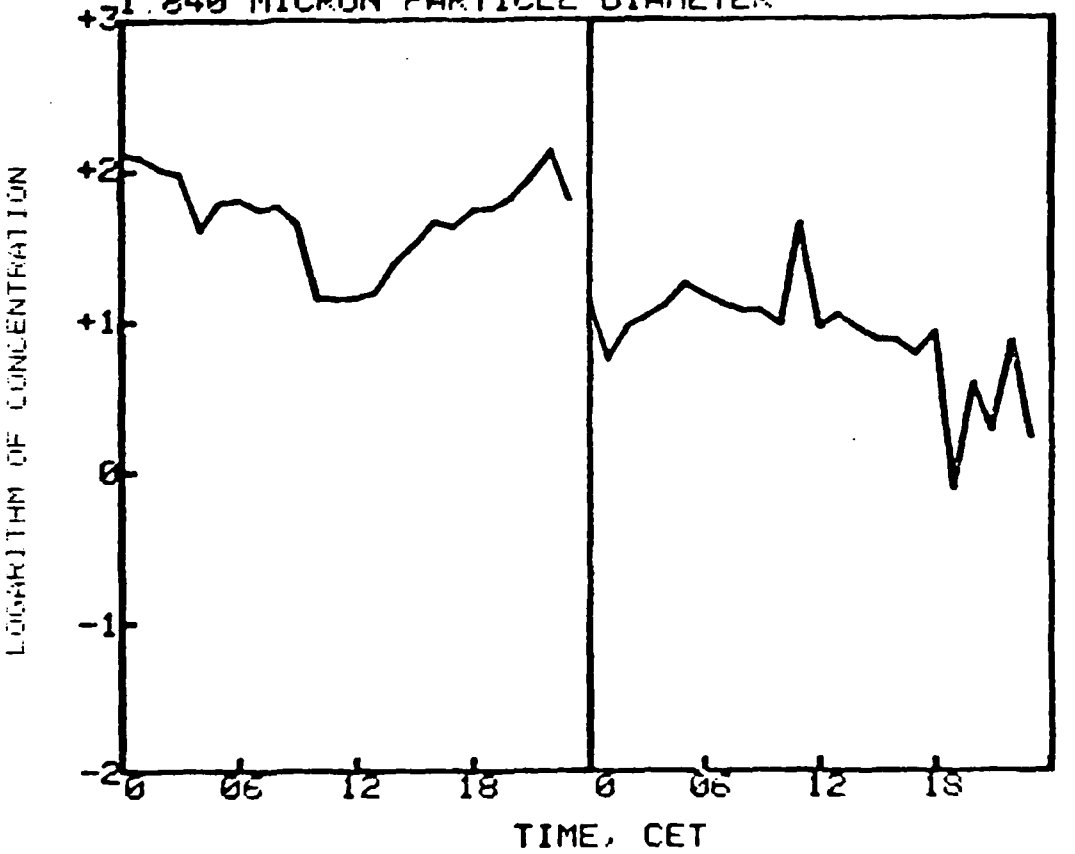
PLOT 2.3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GAPMISH (10)

1.840 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

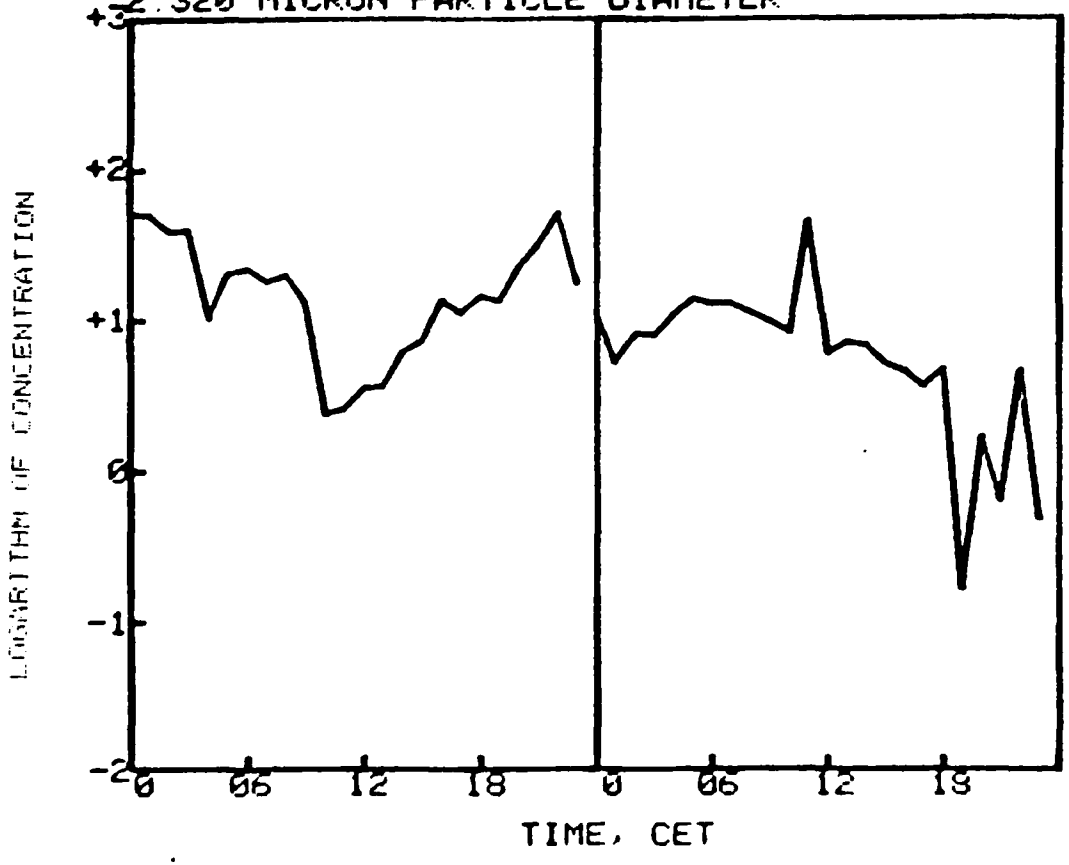
PLOT 2

ICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

2.320 MICRON PARTICLE DIAMETER



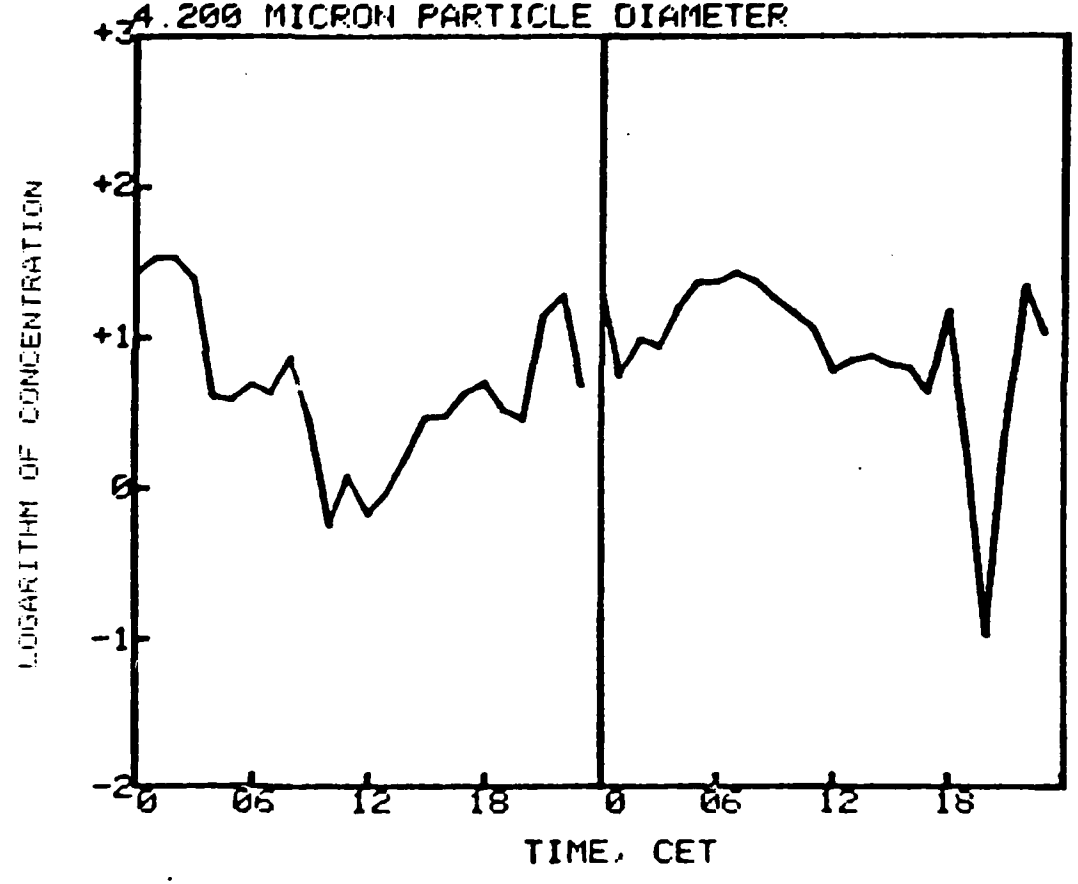
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

4.200 MICRON PARTICLE DIAMETER



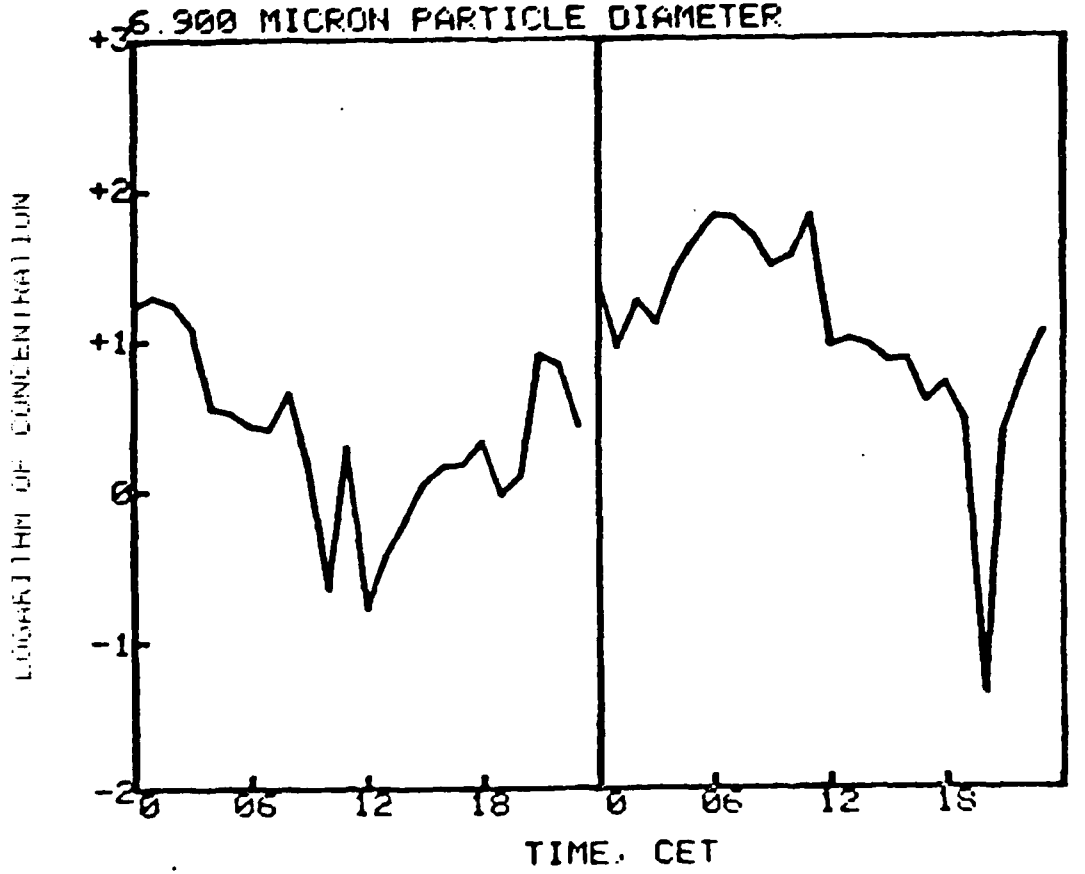
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

6.300 MICRON PARTICLE DIAMETER



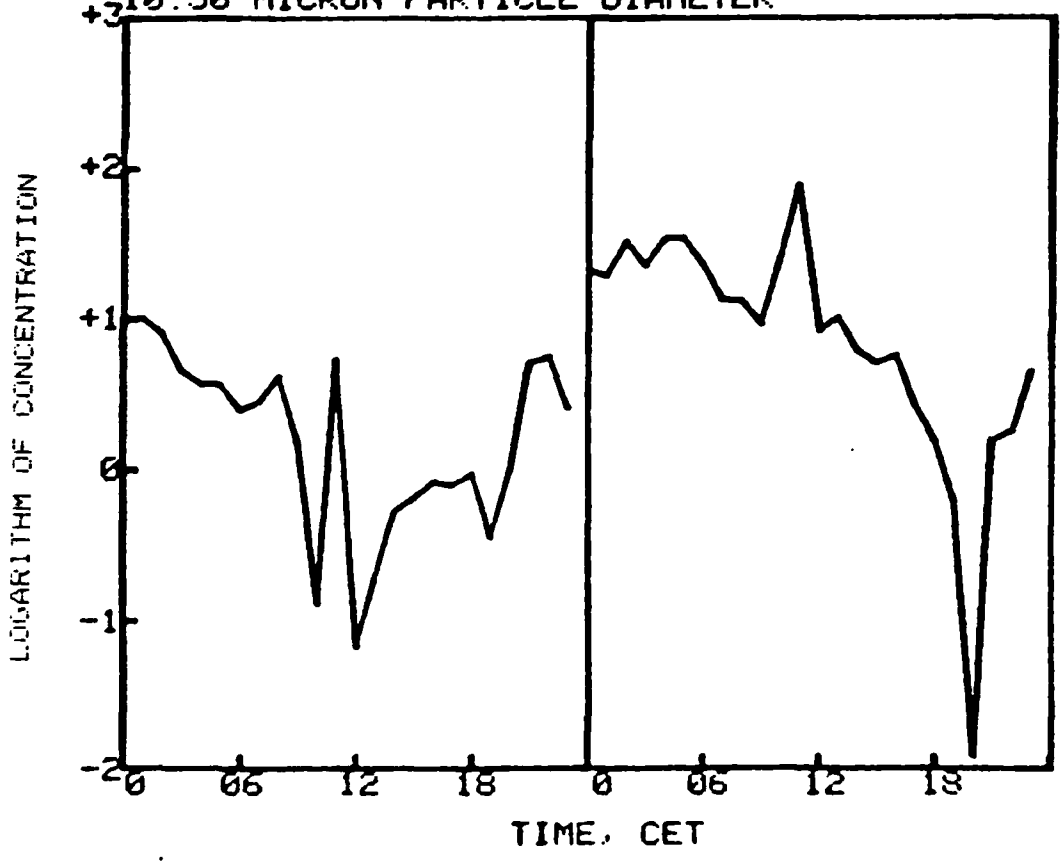
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

10.50 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

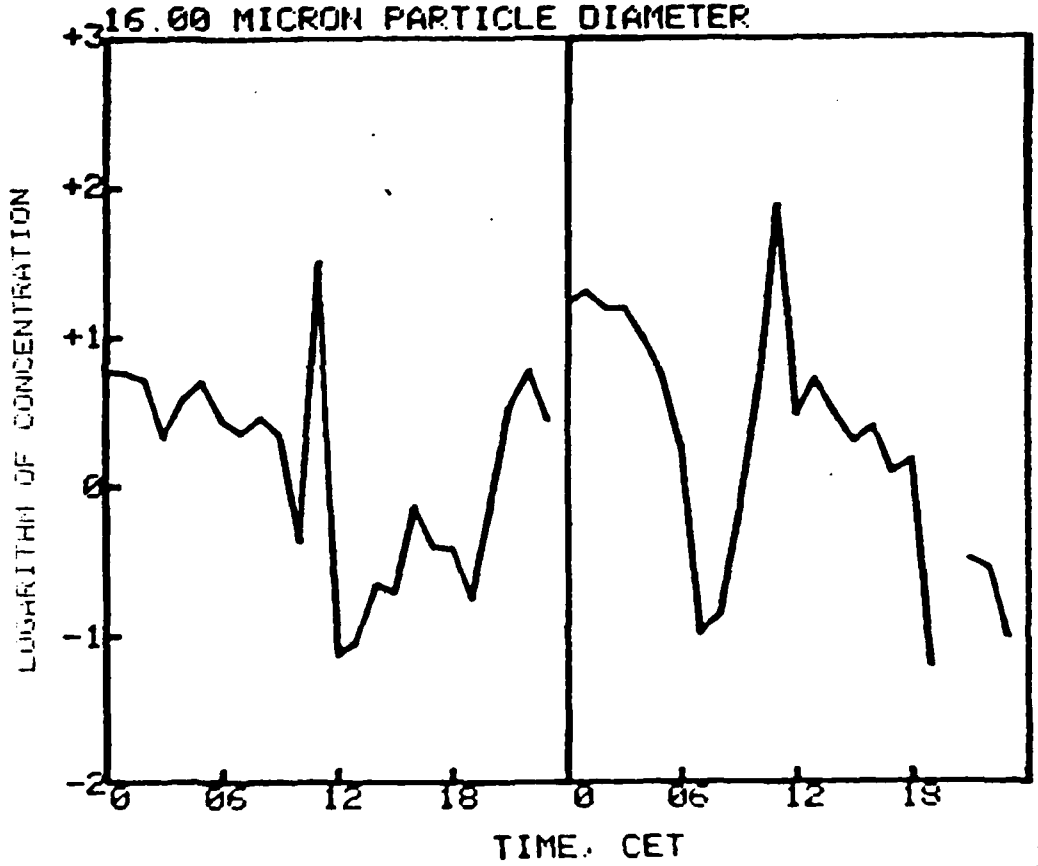
PLOT: 2.8

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT >-0,10 (STABLE)

0023 DAYS; STATION: WANK AND GARMISH (10)

16.00 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

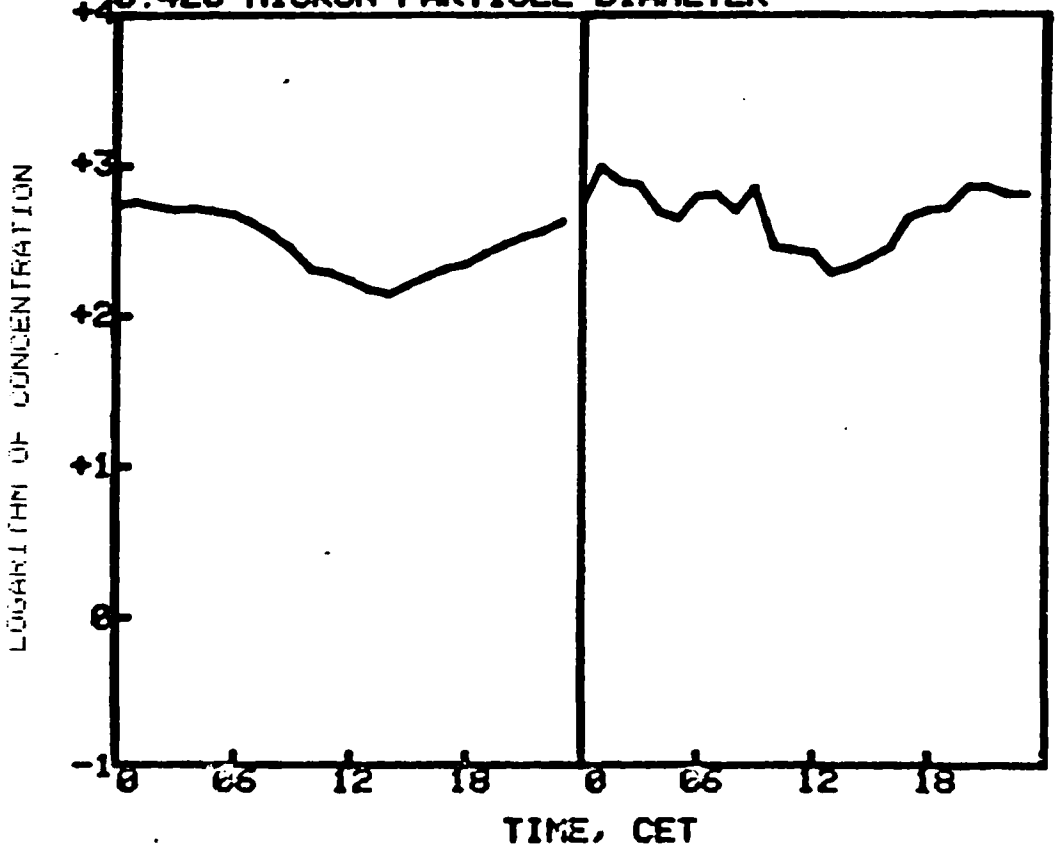
PLOT 2.6

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

0.420 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1783 M

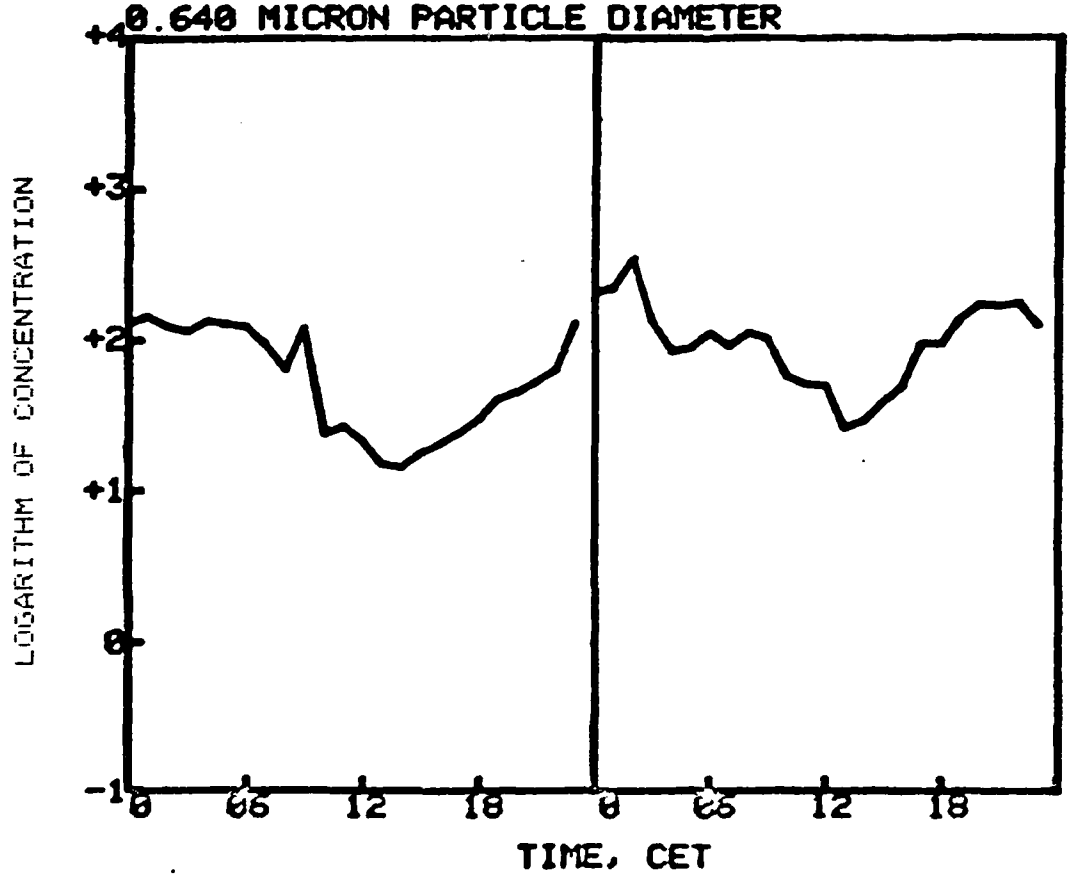
PLOT: 3.1

RTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

0.640 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1783 M

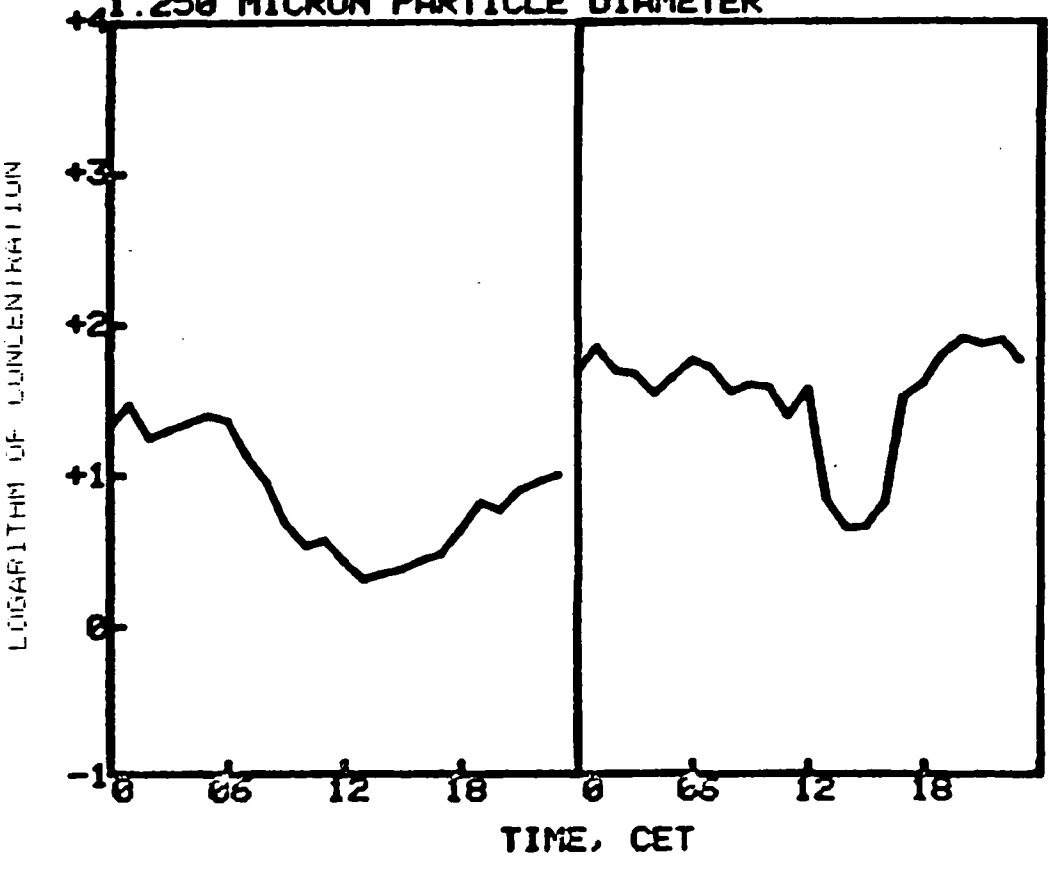
PLOT 3.7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

1.250 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

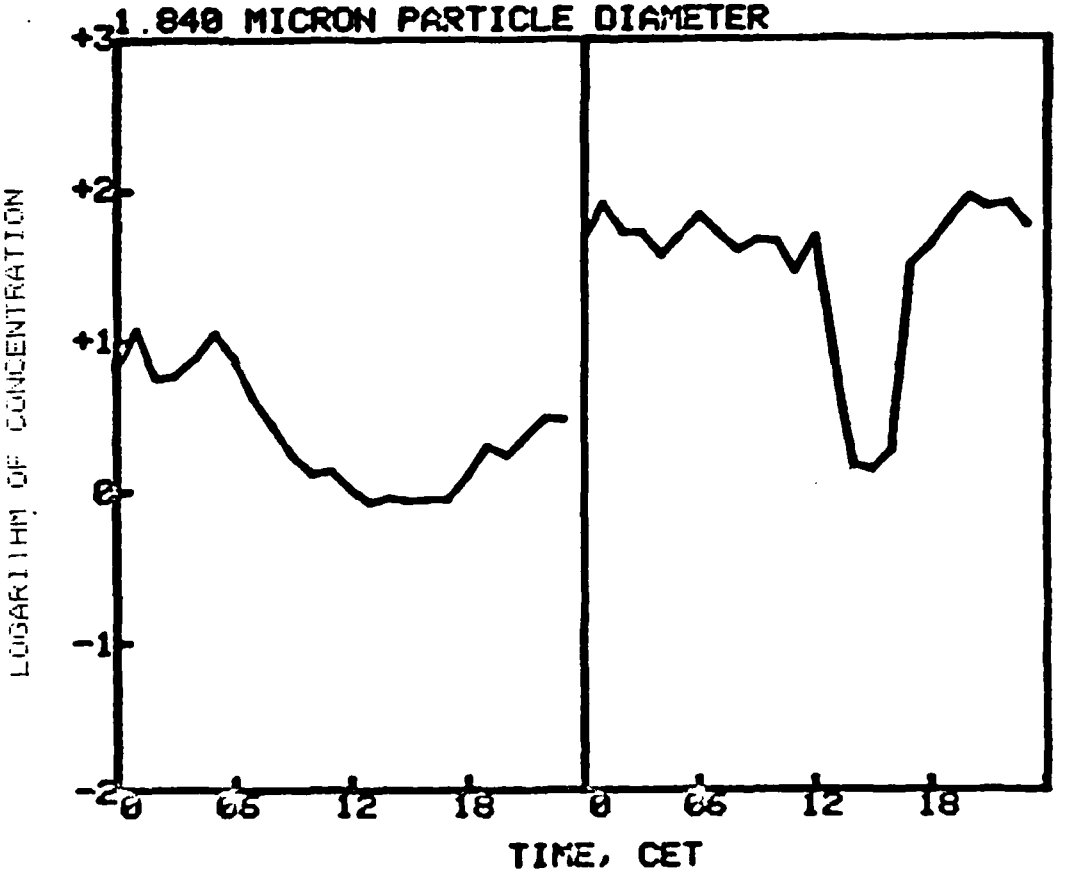
PLOT 3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

1.840 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

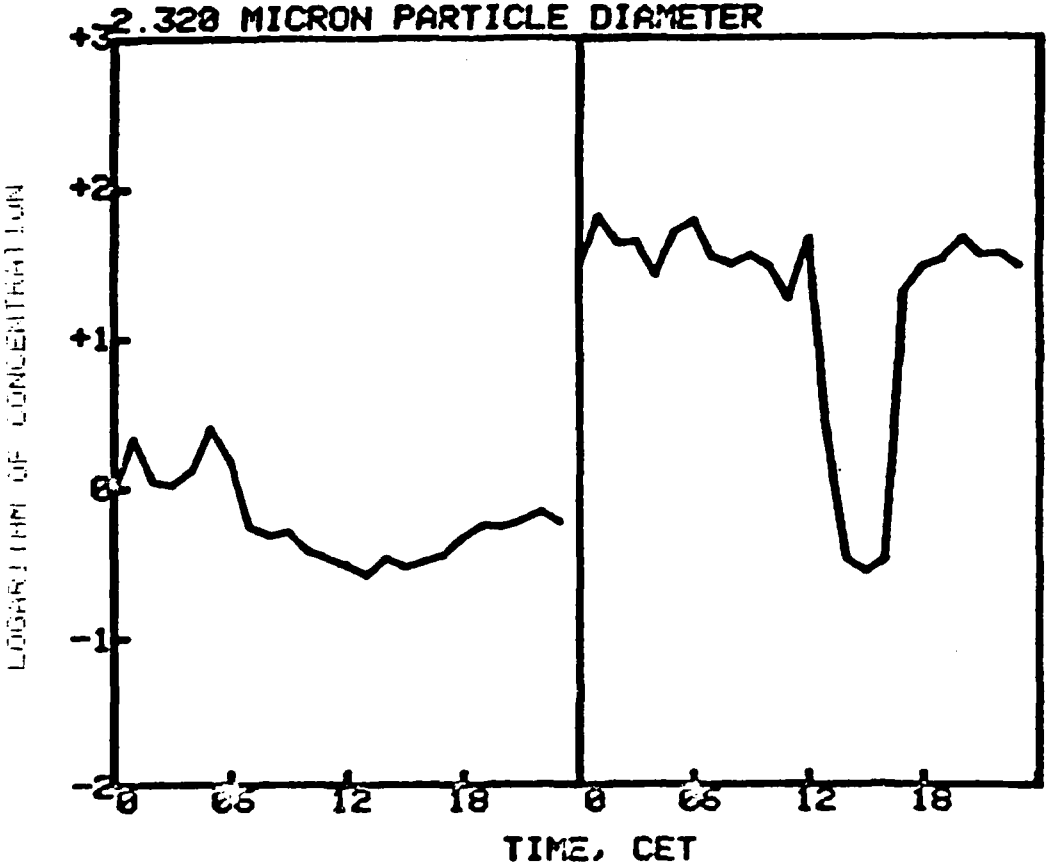
PLOT: 3.4

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

2.320 MICRON PARTICLE DIAMETER



GARMISCH, 748 M WANK, 1783 M

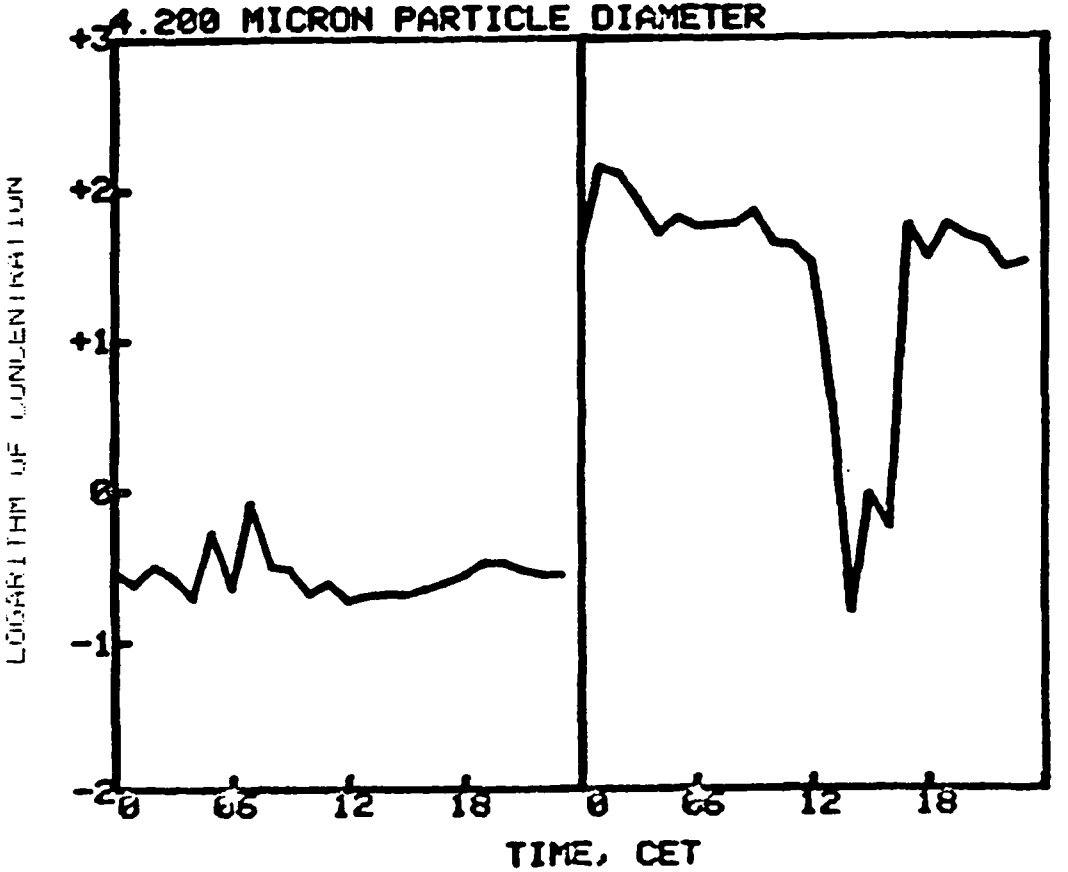
PLOT: 3.5

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

4.200 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1783 M

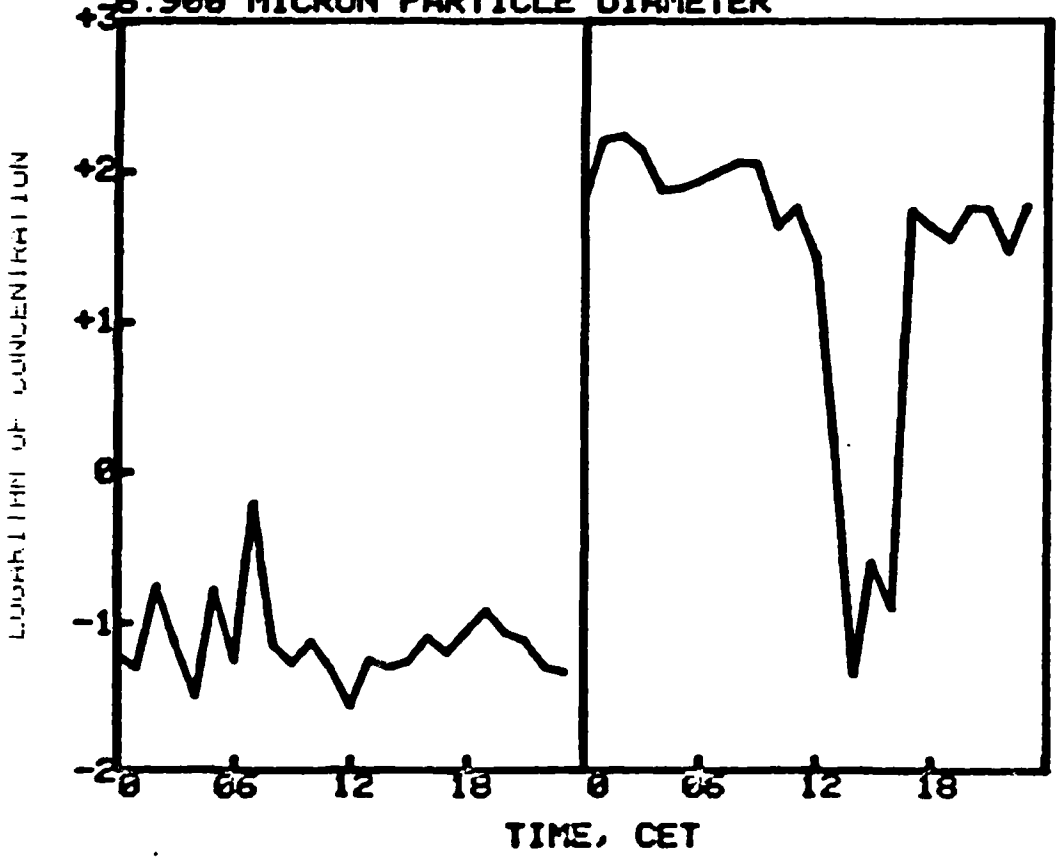
PLOT: 3.6

PARTICLE CONC. (DN/D LOG D) PER CM+3

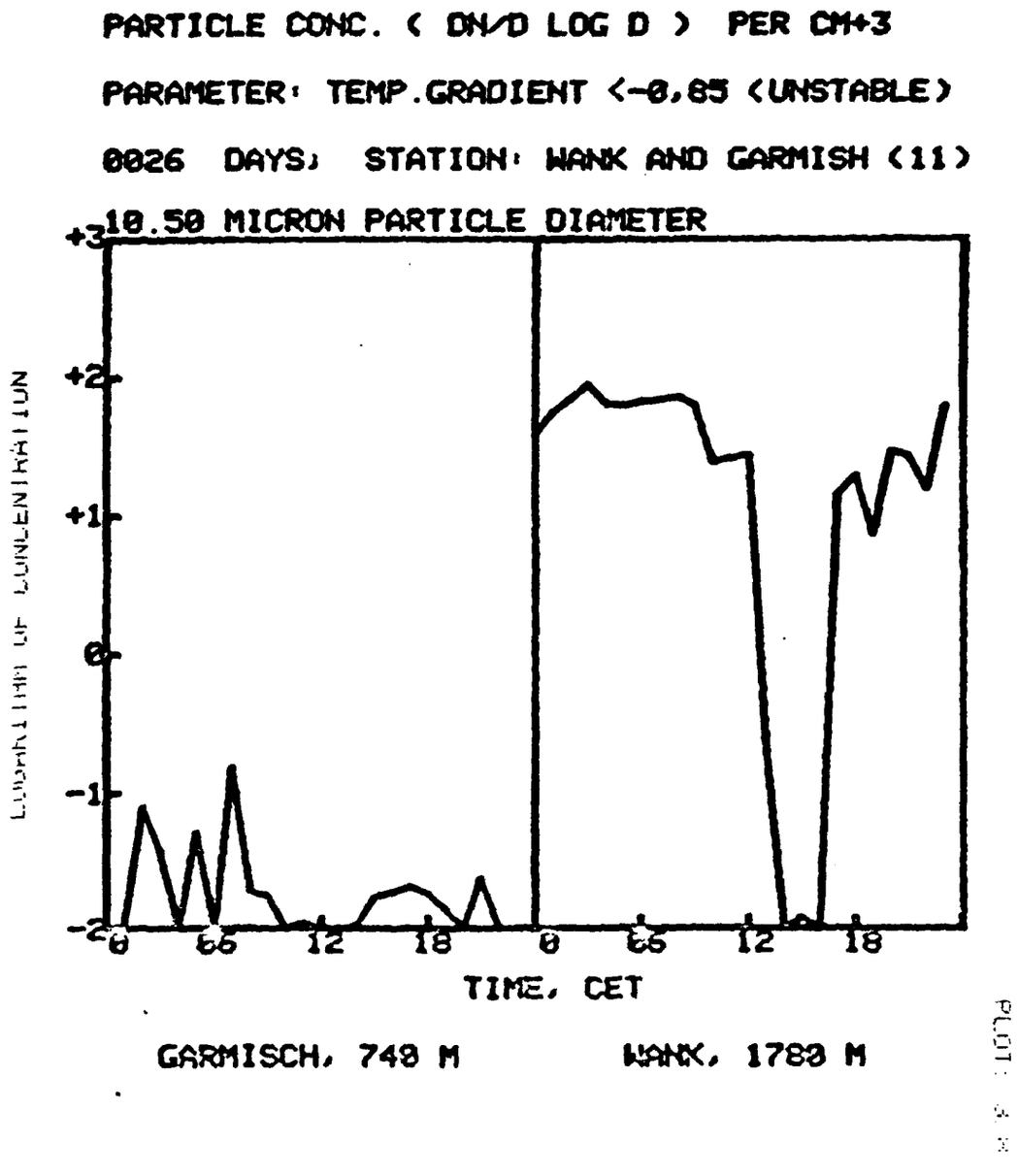
PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

6.900 MICRON PARTICLE DIAMETER



GARMISCH, 748 M WANK, 1780 M

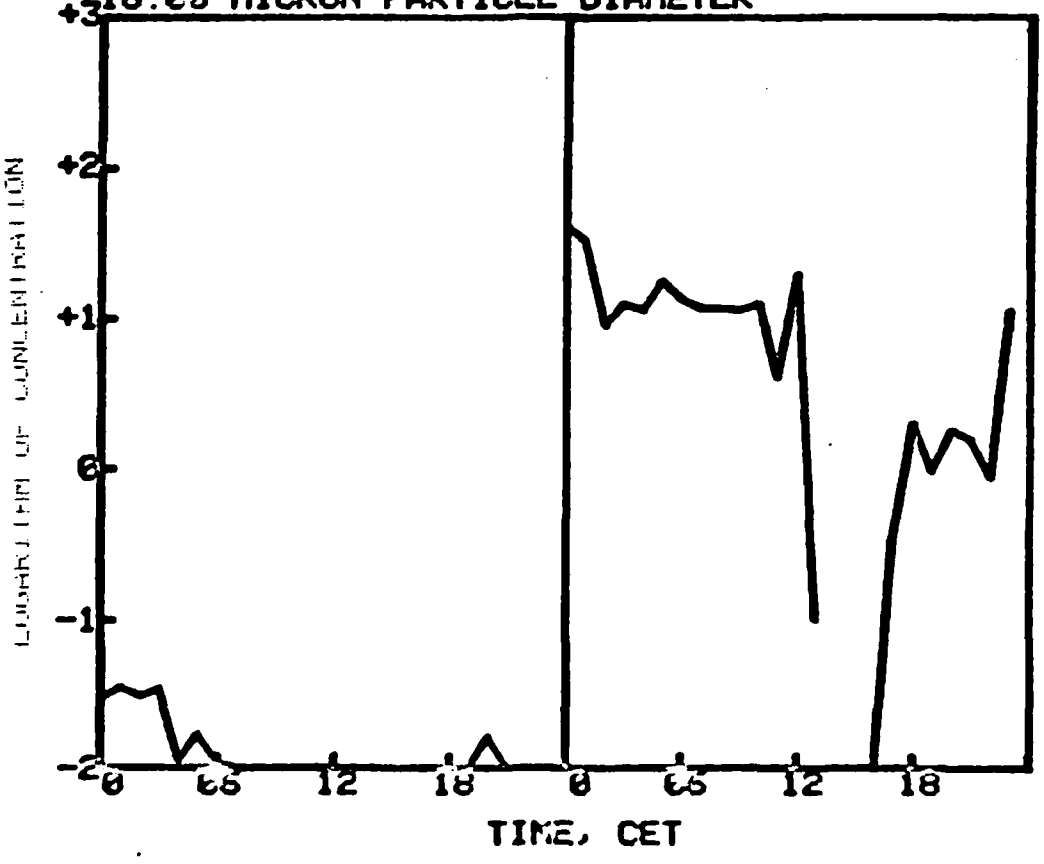

PARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)
0026 DAYS; STATION: WANK AND GARMISH (11)
10.50 MICRON PARTICLE DIAMETER
+3
+2
+1
0
-1
-2
0
06
12
18
0
06
12
18
TIME, CET
GARMISCH, 748 M
WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: TEMP.GRADIENT <-0,85 (UNSTABLE)

0026 DAYS; STATION: WANK AND GARMISH (11)

16.00 MICRON PARTICLE DIAMETER



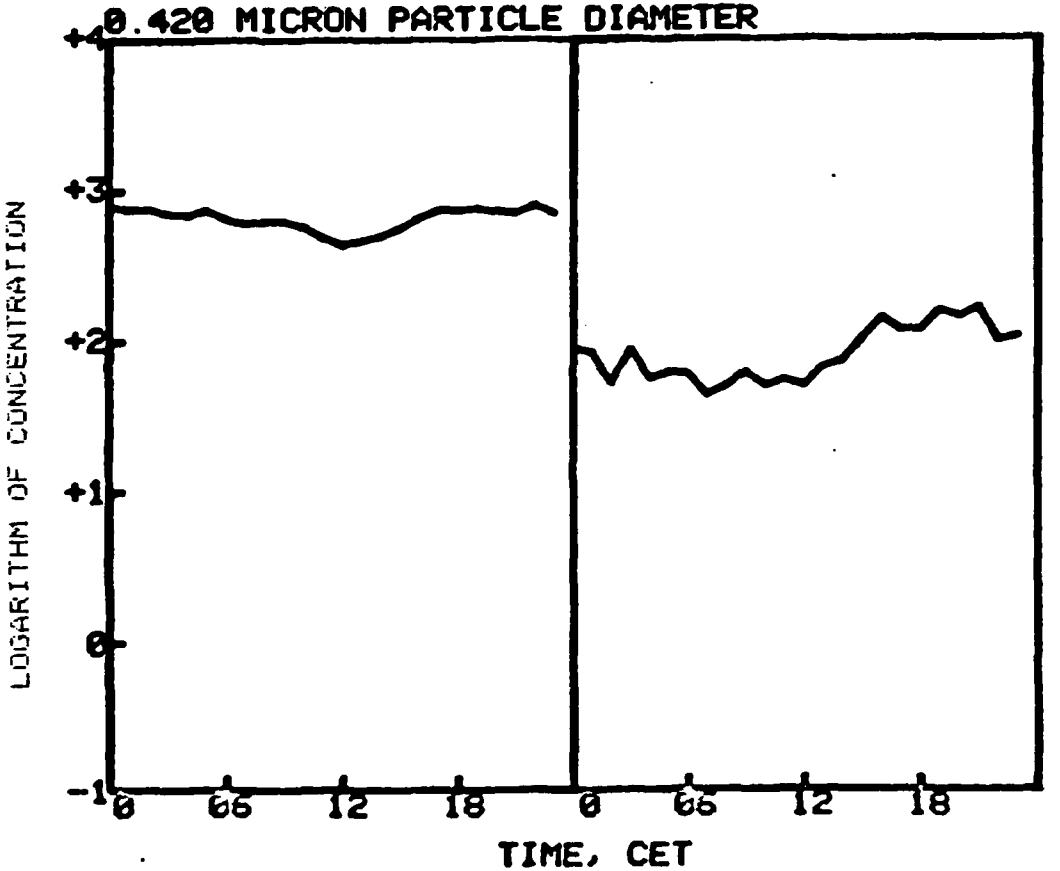
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

0.420 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

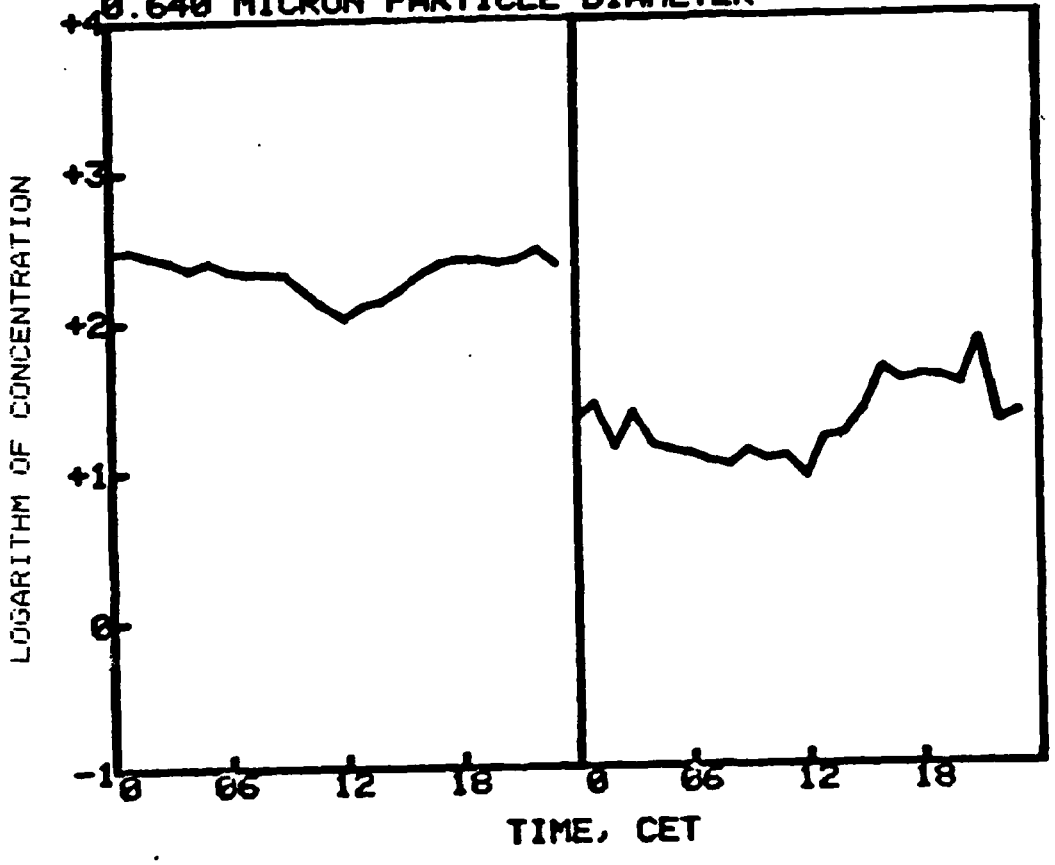
F1 CT 4 1

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

0.640 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

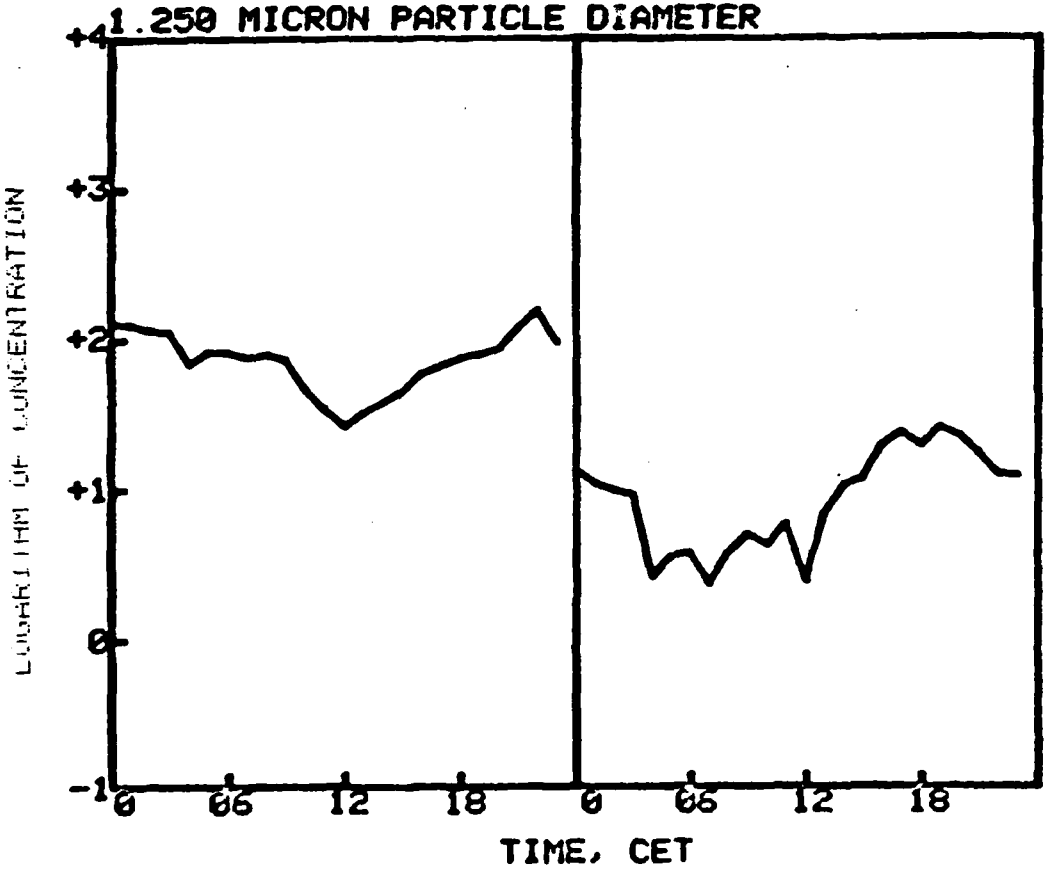
PLOT: 4.2

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

1.250 MICRON PARTICLE DIAMETER



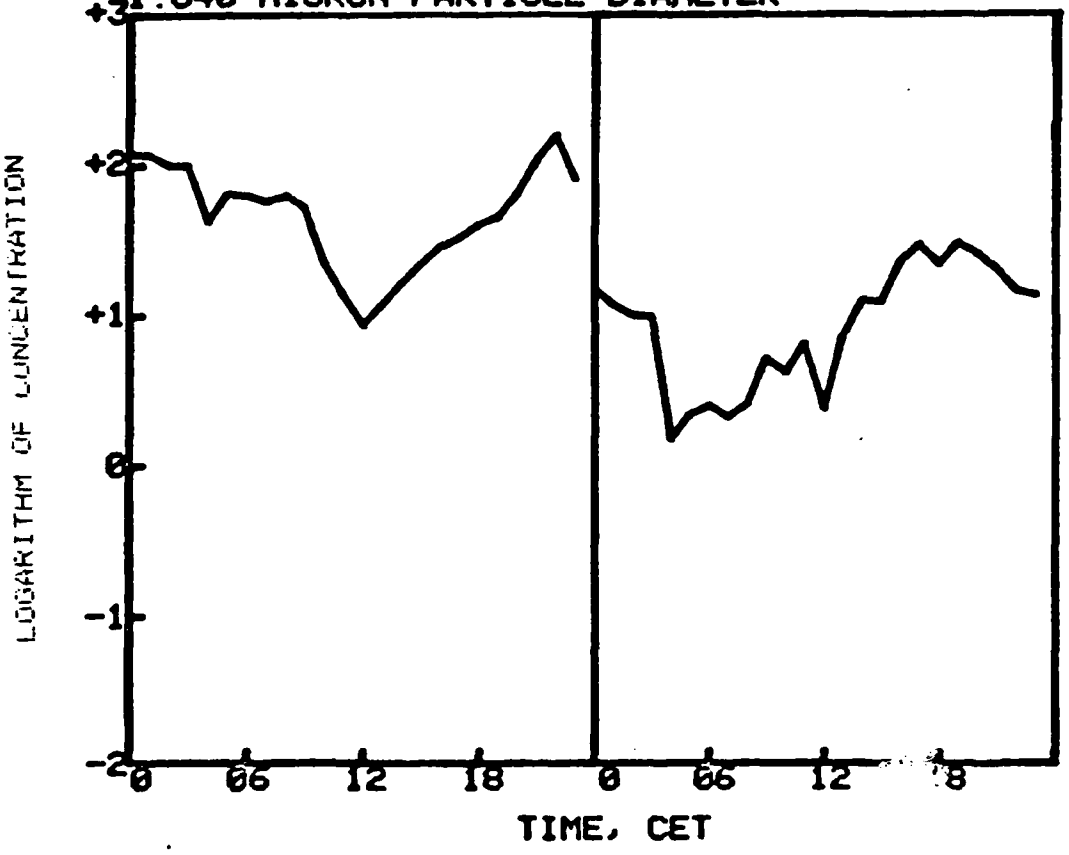
GARMISCH, 749 M WANK, 1783 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

1.840 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

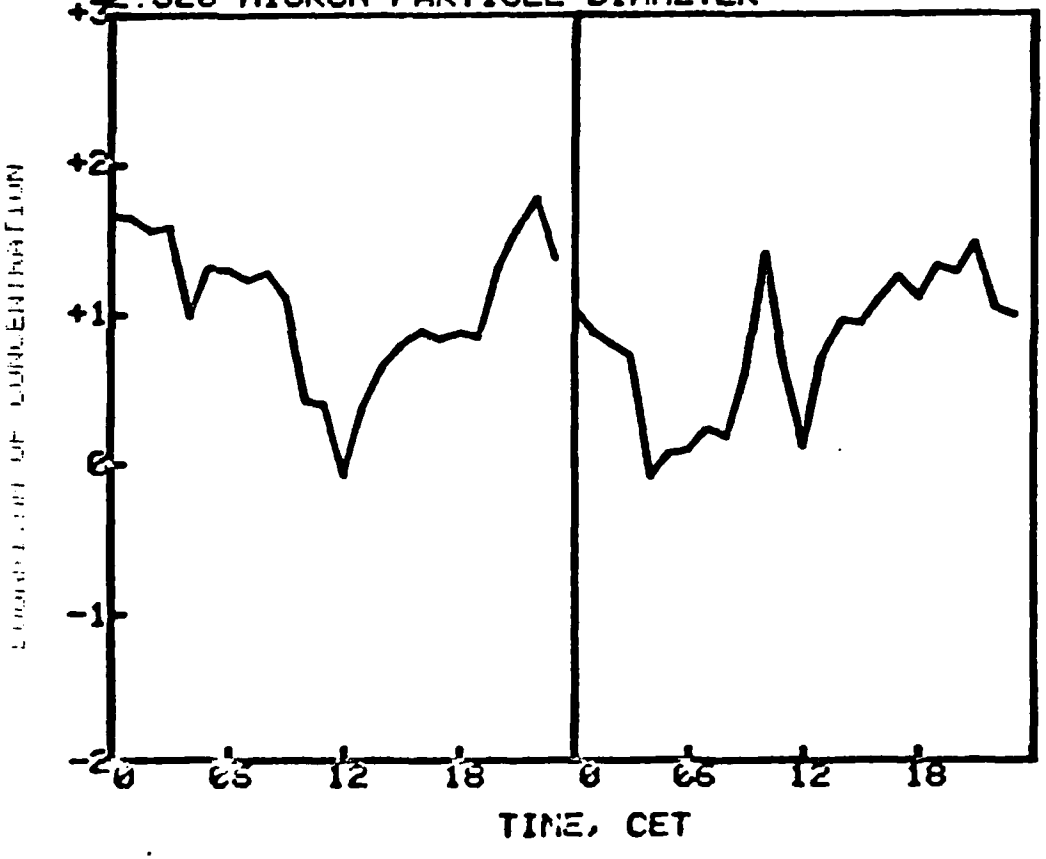
PLOT: 4.4

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .1EE-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

2.320 MICRON PARTICLE DIAMETER



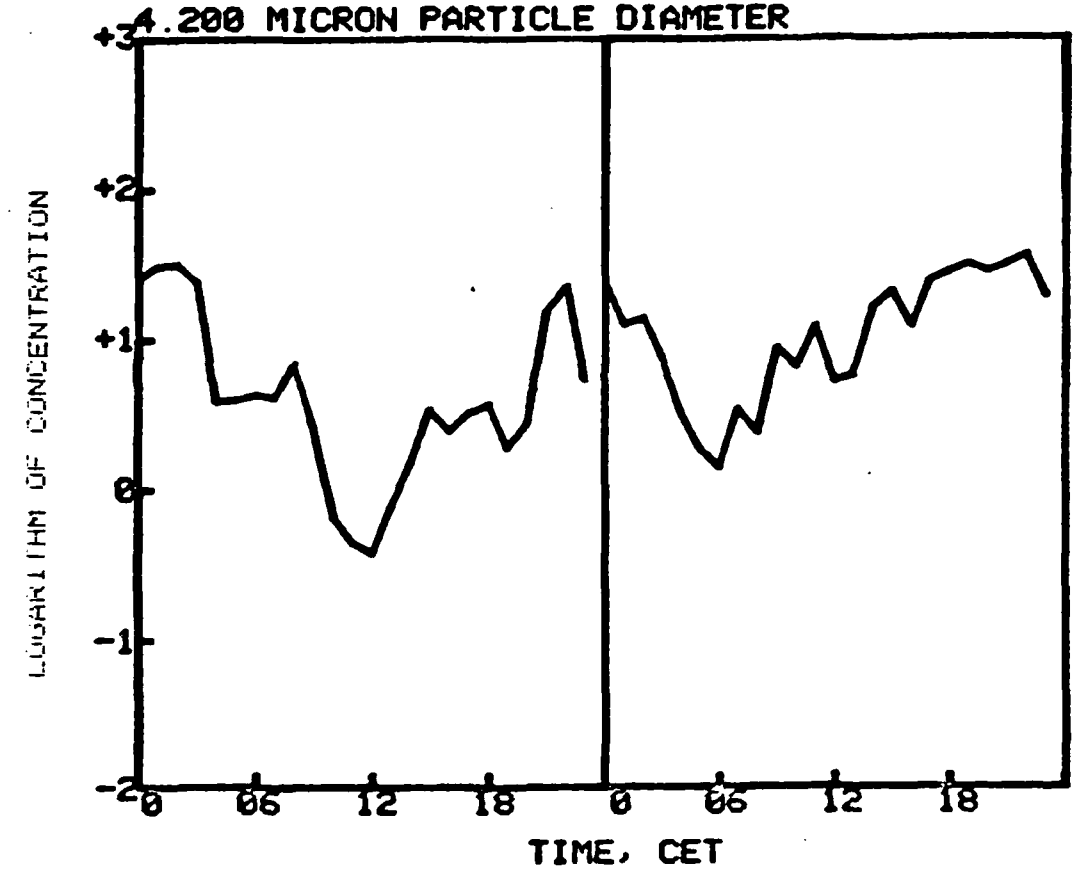
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

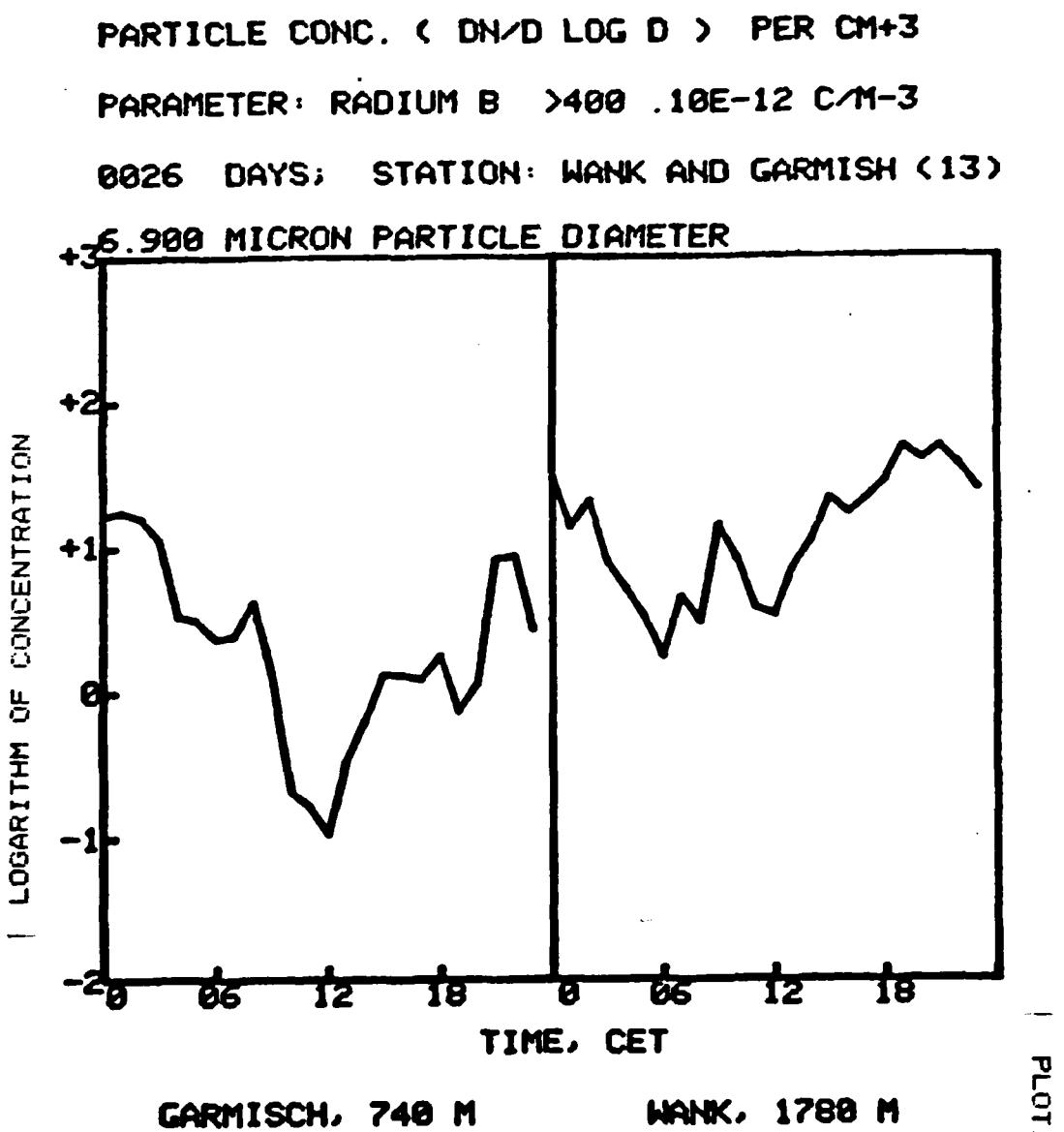
0026 DAYS; STATION: WANK AND GARMISH (13)

4.200 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

FLUI. 4.9

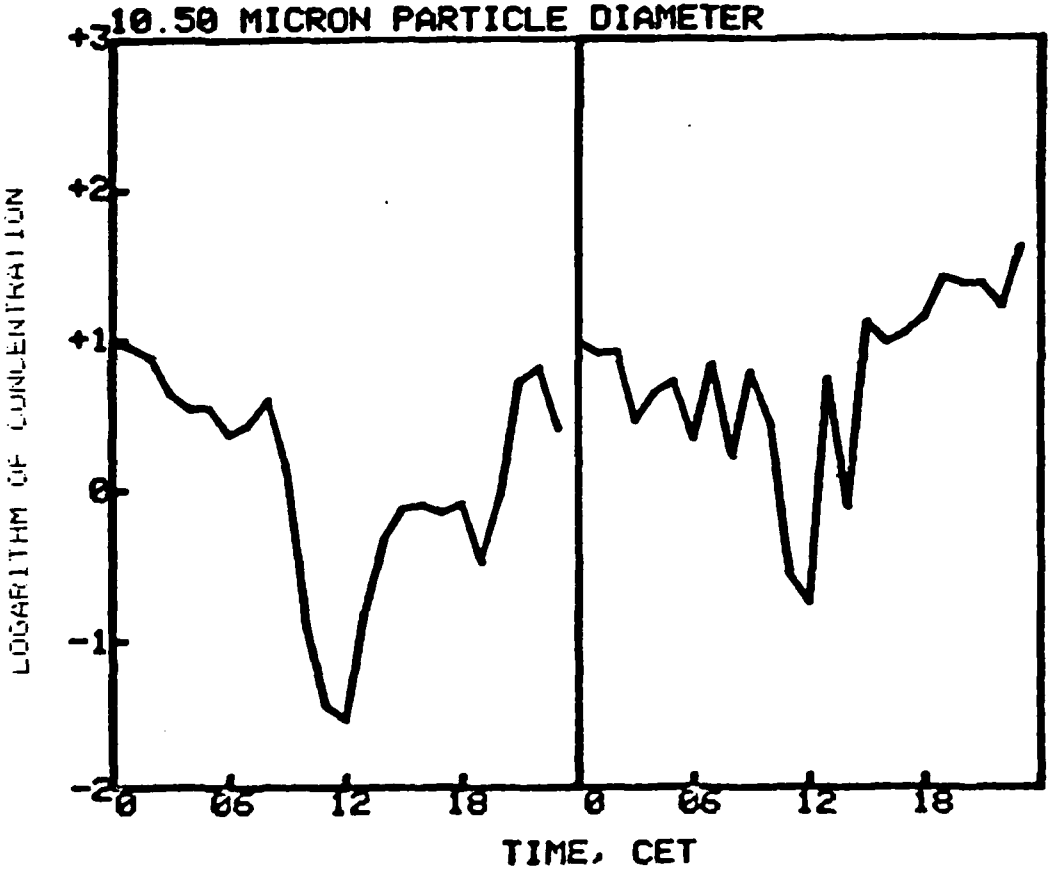

PARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: RADIUM B >400 .10E-12 C/M-3
0026 DAYS; STATION: WANK AND GARMISH (13)
6.900 MICRON PARTICLE DIAMETER
+3
+2
+1
0
-1
-2
LOGARITHM OF CONCENTRATION
0
06
12
18
0
06
12
18
TIME, CET
GARMISCH, 740 M
WANK, 1780 M
PLOT: 4.7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

10.50 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

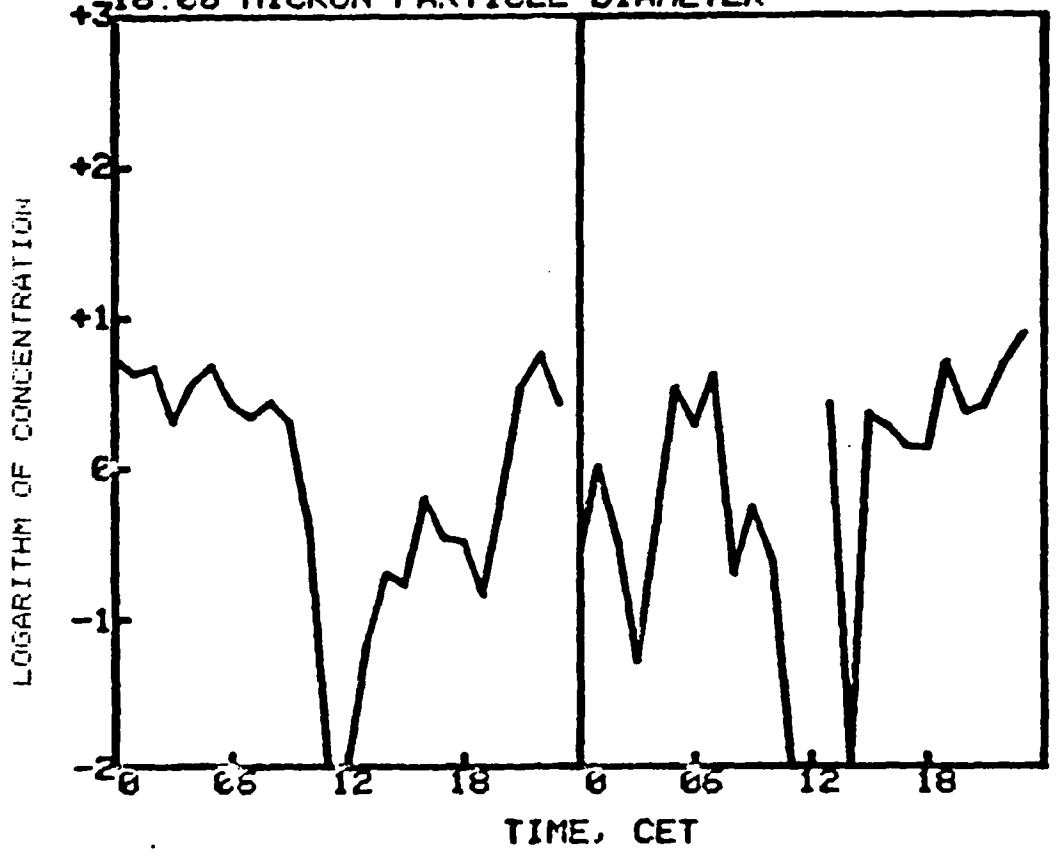
PLOT 4.8

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B >400 .10E-12 C/M-3

0026 DAYS; STATION: WANK AND GARMISH (13)

16.00 MICRON PARTICLE DIAMETER



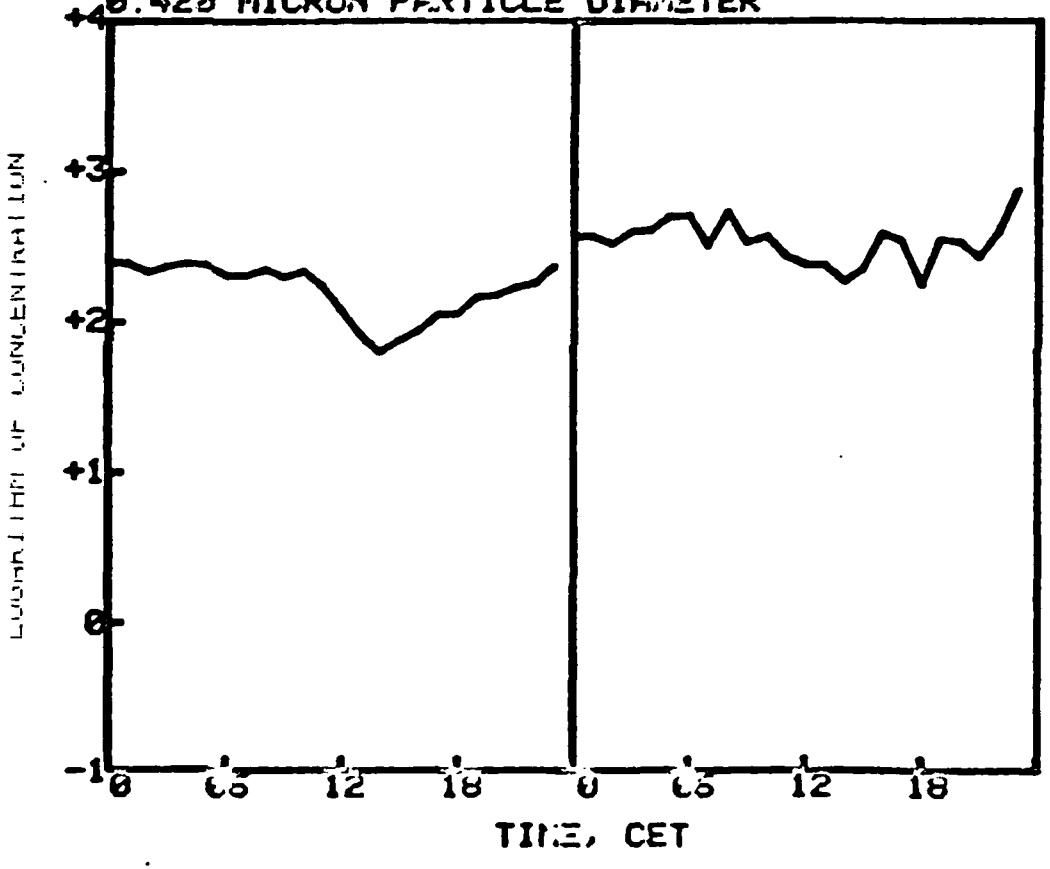
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B <40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

0.420 MICRON PARTICLE DIAMETER



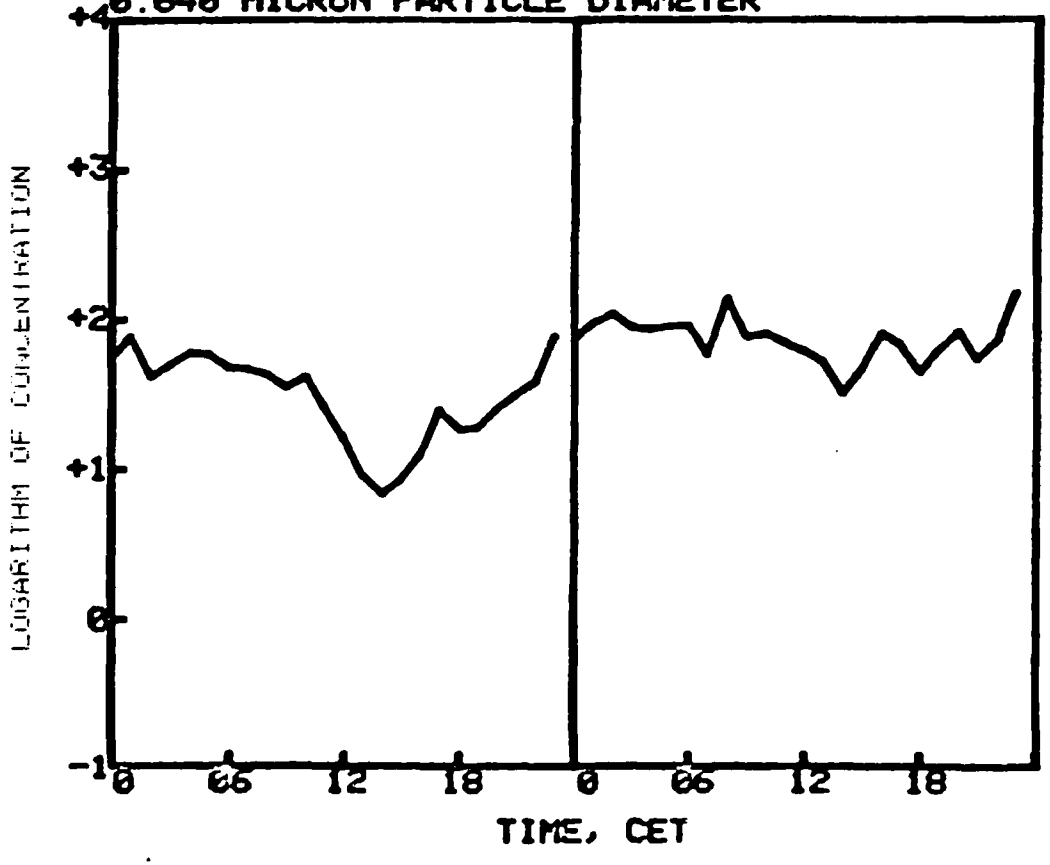
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B <40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

0.640 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

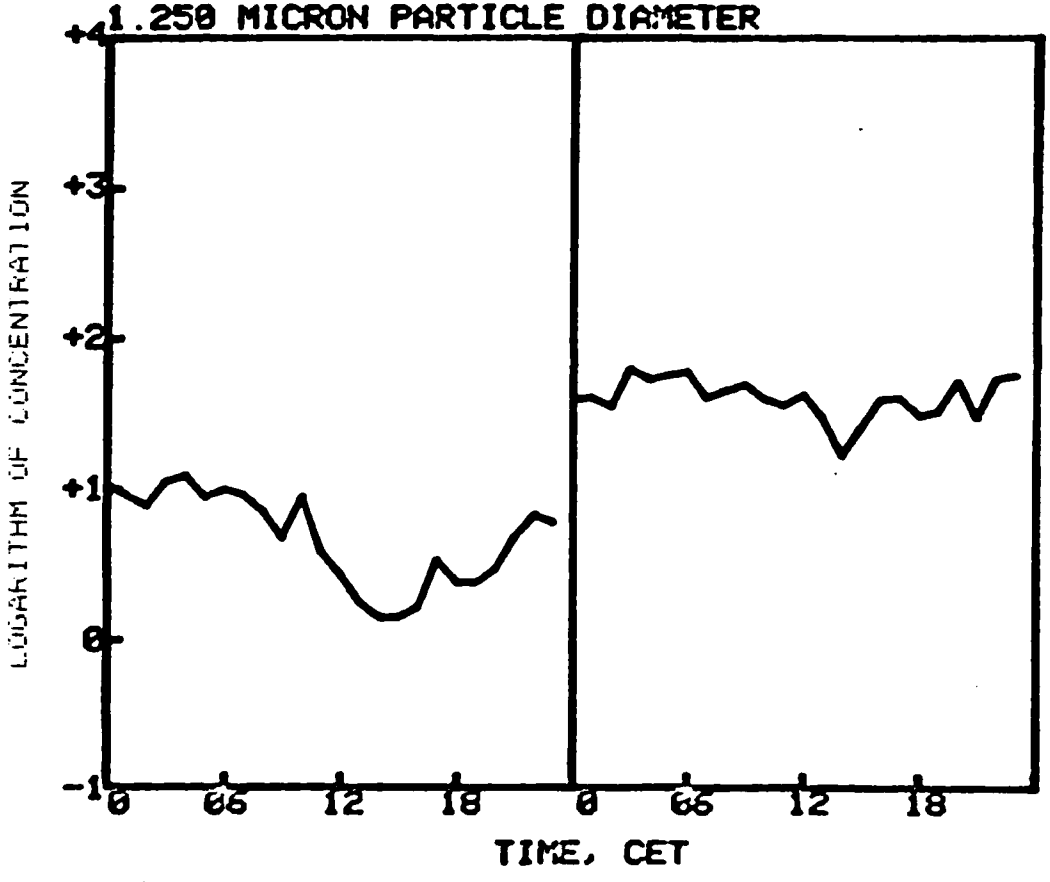
PLOT 5.7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B (40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

1.250 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1763 M

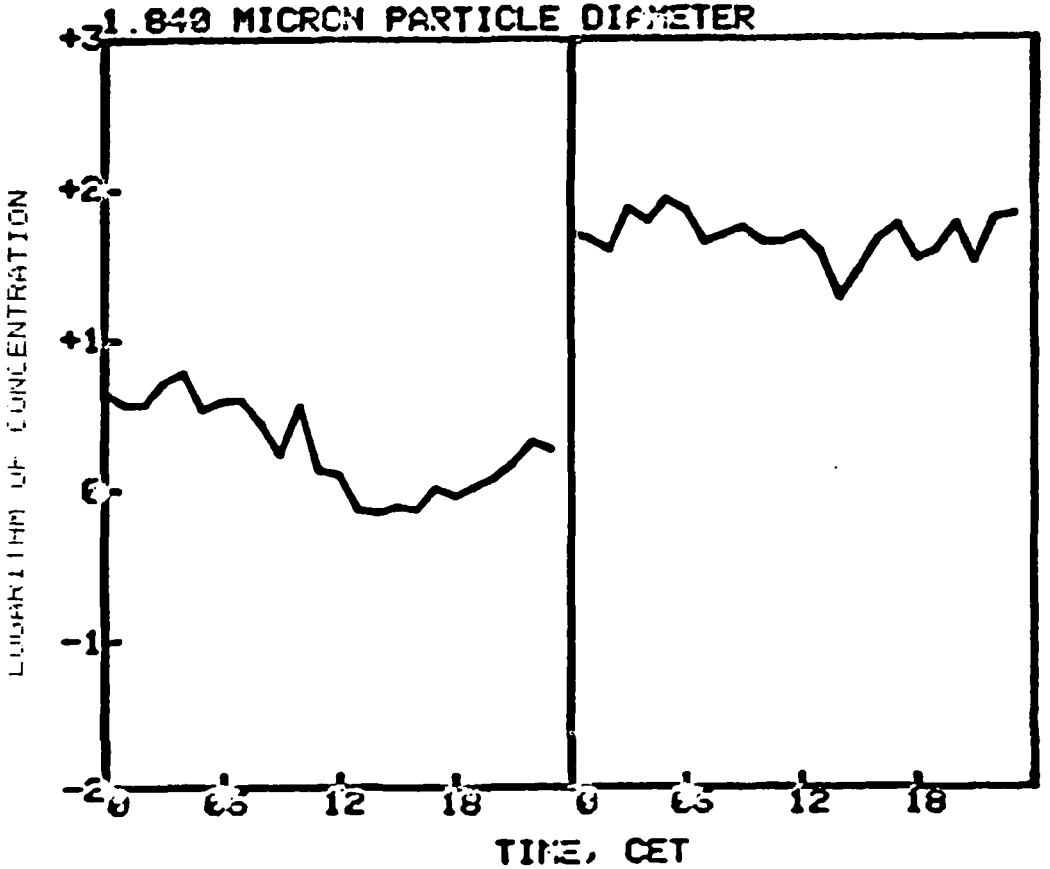
FIG 5.3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B <40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

1.840 MICRON PARTICLE DIAMETER



GARMISCH, 743 M WANK, 1780 M

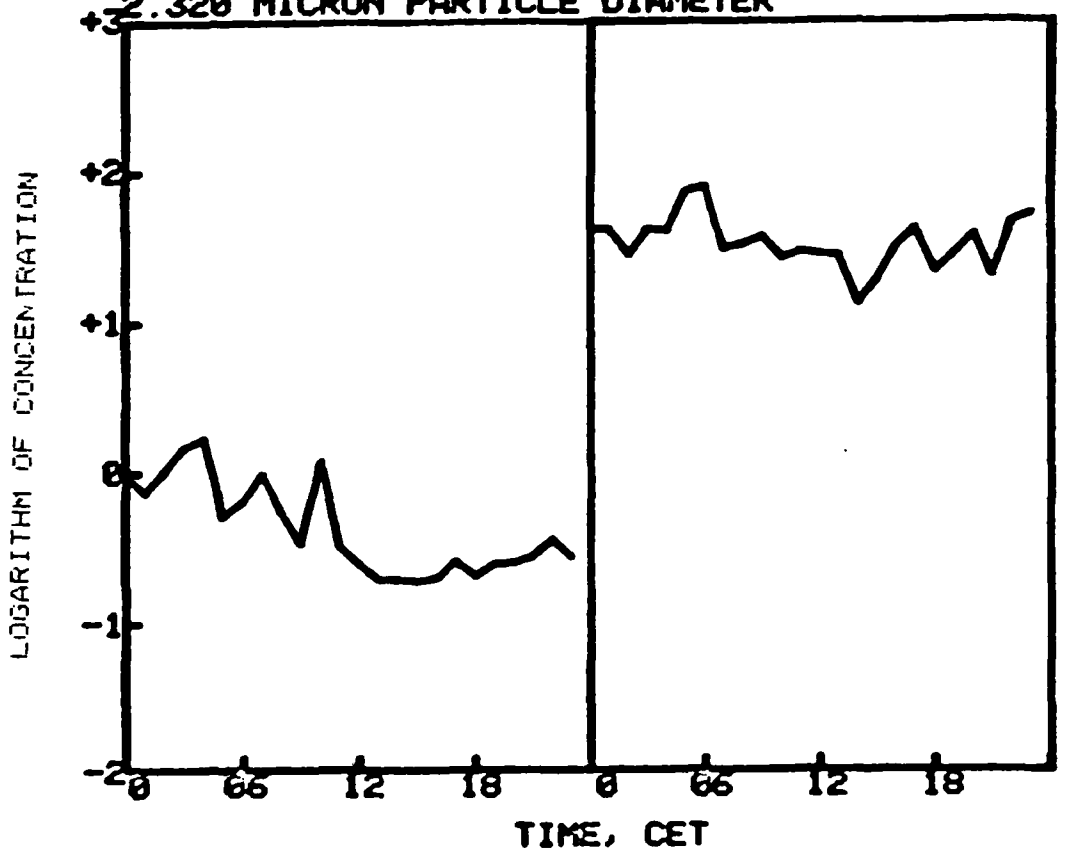
FLUT 5.4

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B <40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

2.320 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

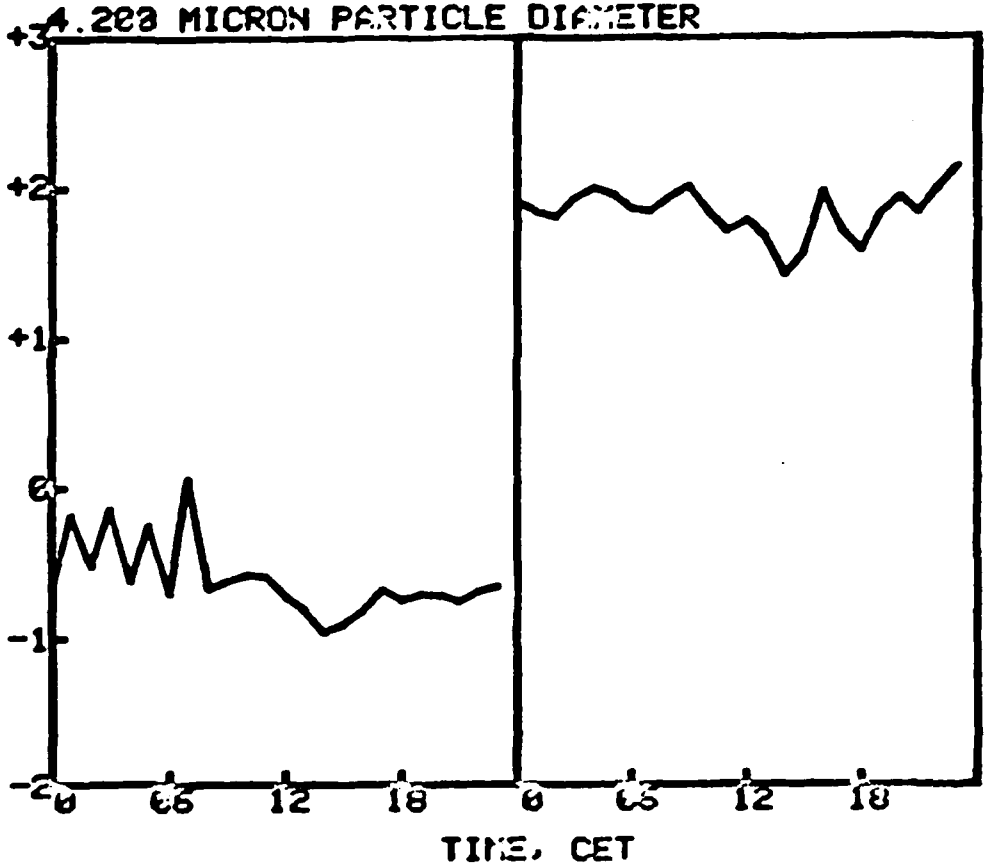
PLOT: 5.5

PARTICLE CONC. (DN/D LOG D) PER CM+3

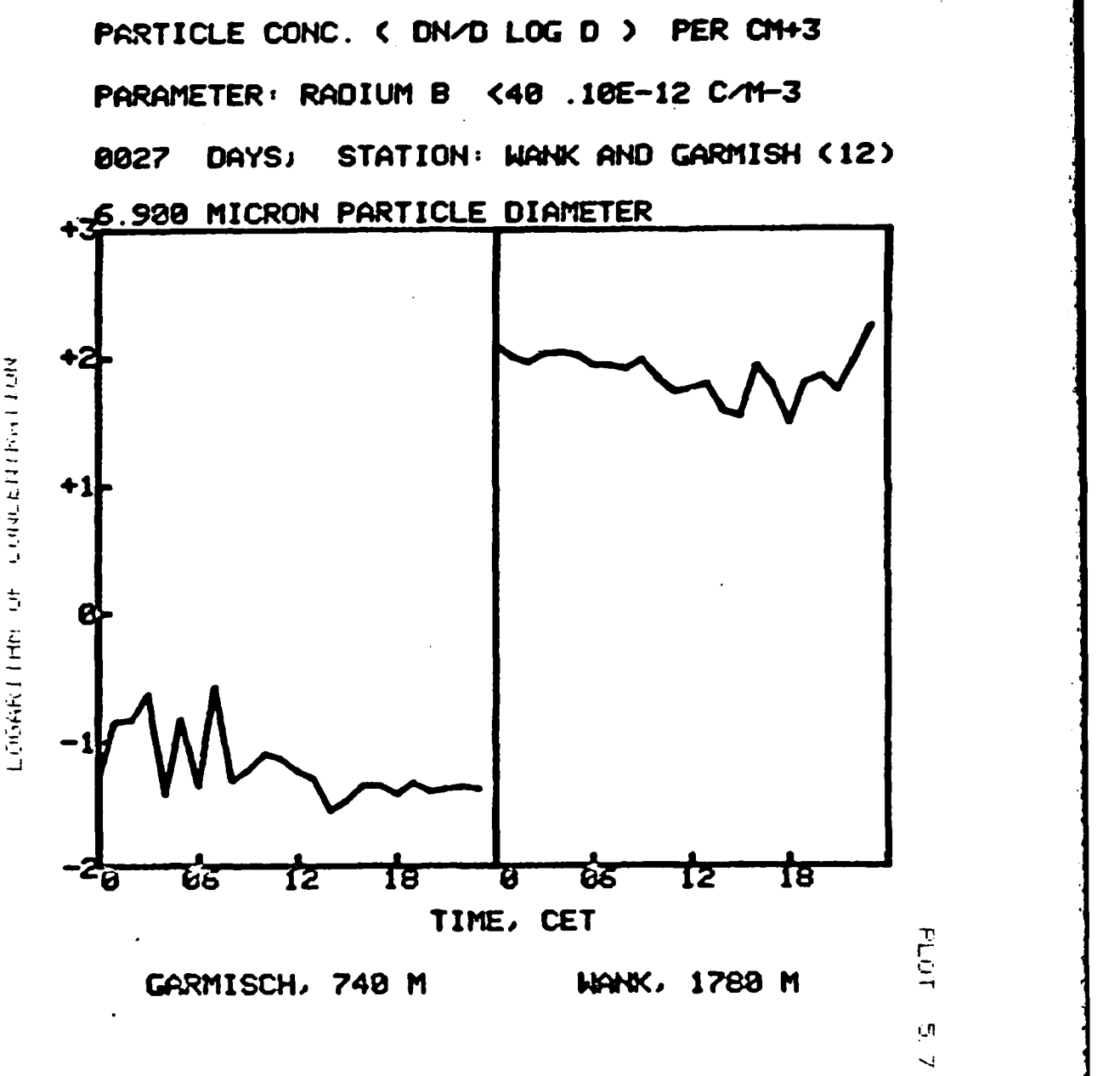
PARAMETER: RADIUM B <40 .1EE-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

4.200 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

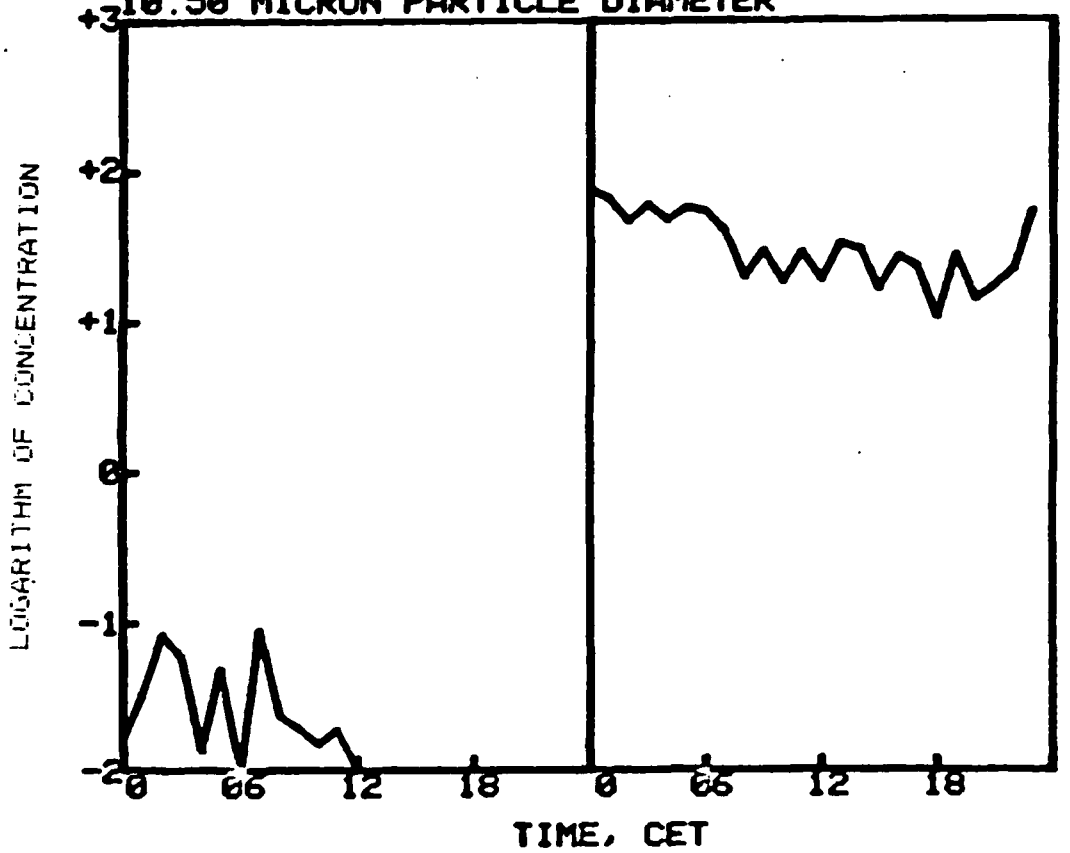

PARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: RADIUM B <40 .10E-12 C/M-3
0027 DAYS; STATION: WANK AND GARMISH (12)
6.900 MICRON PARTICLE DIAMETER
+3
+2
+1
0
-1
-2
0
06
12
18
0
06
12
18
TIME, CET
GARMISCH, 740 M
WANK, 1780 M
PLOT 5.7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B <40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

10.50 MICRON PARTICLE DIAMETER



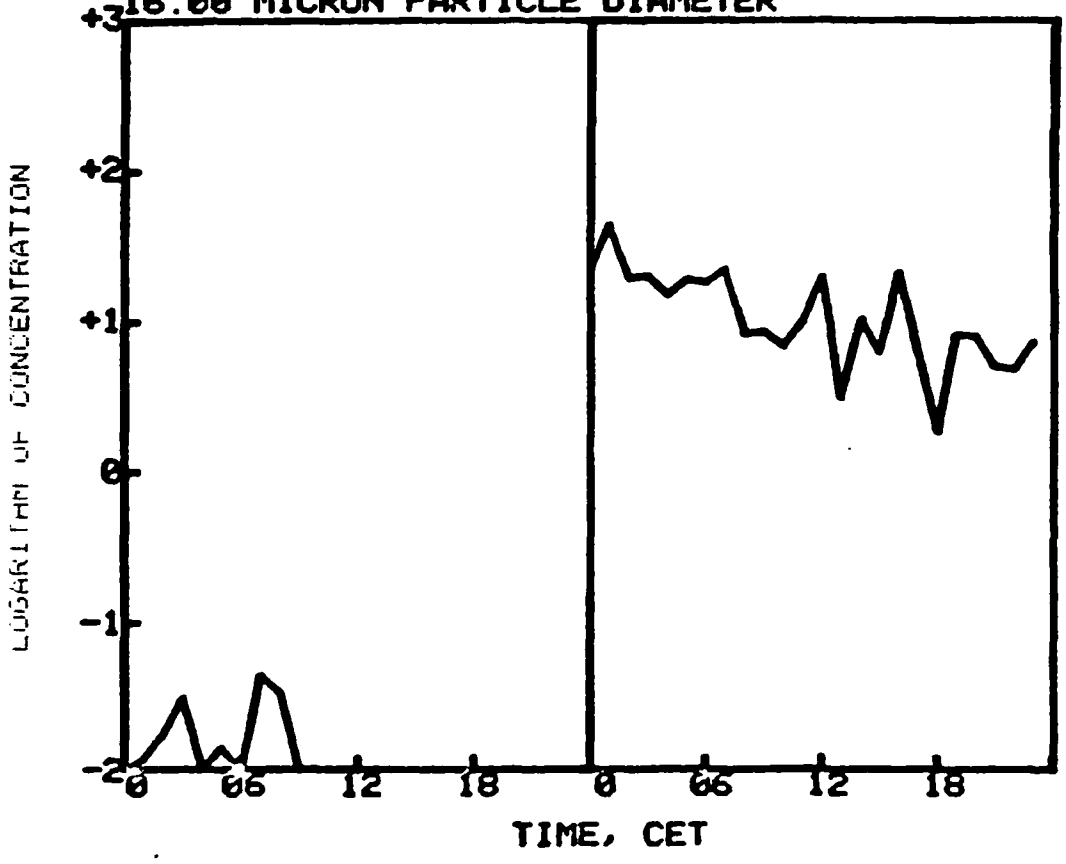
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: RADIUM B <40 .10E-12 C/M-3

0027 DAYS; STATION: WANK AND GARMISH (12)

16.00 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

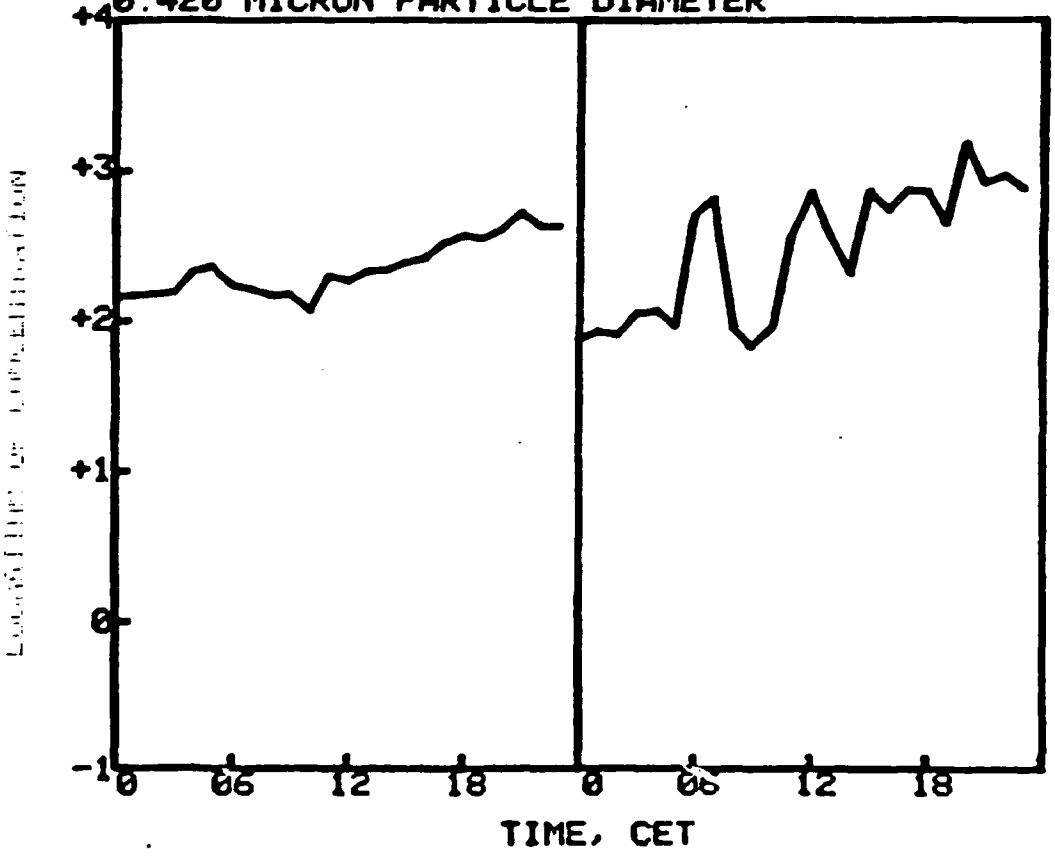
PLOT. S.4

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

0.420 MICRON PARTICLE DIAMETER



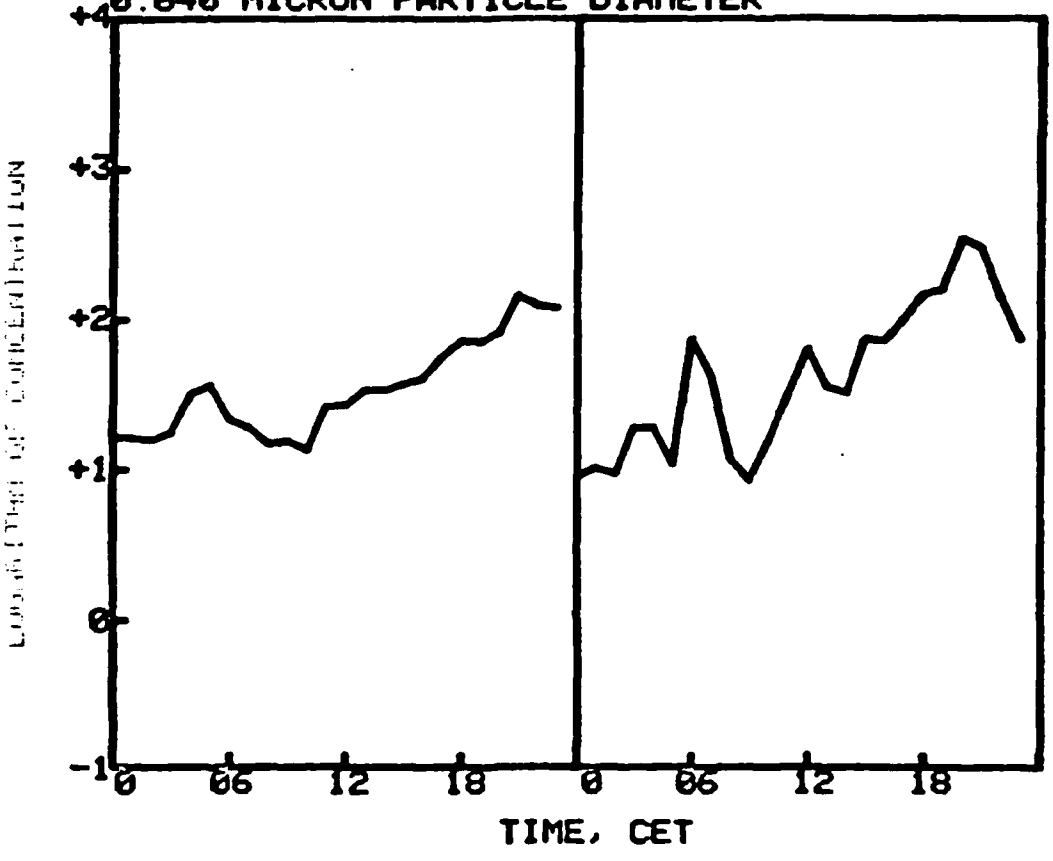
GARMISCH, 740 M WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

0.640 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

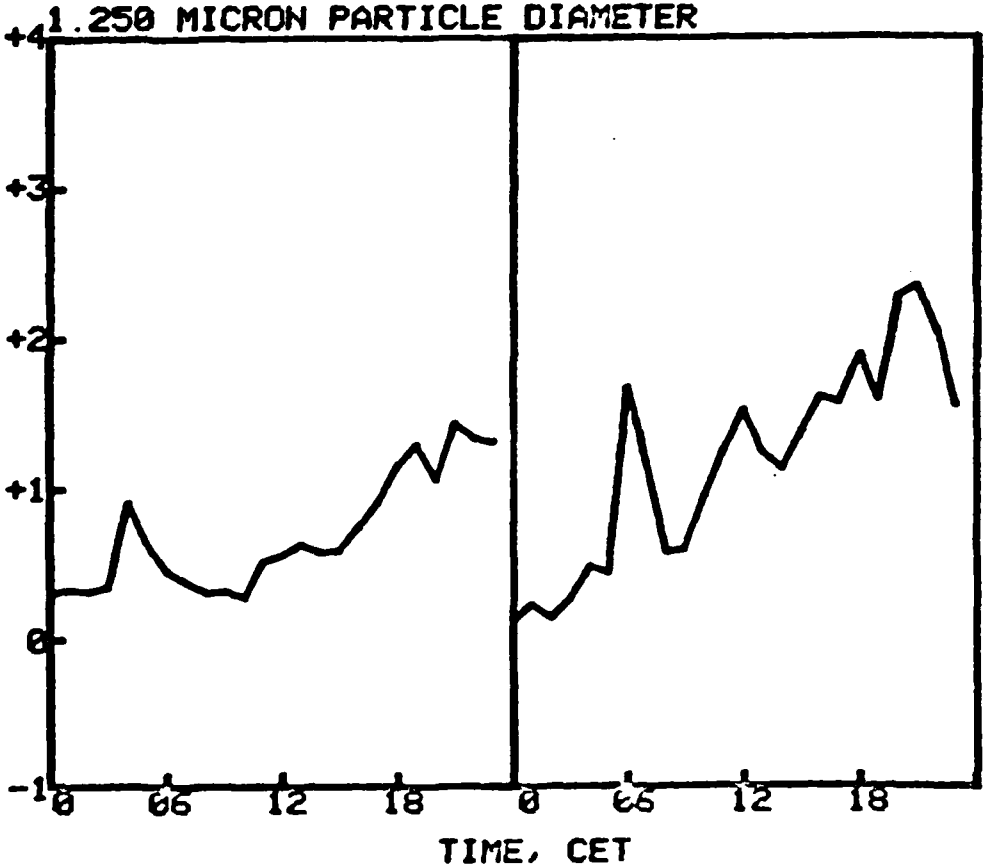
PLOT 6.2

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

1.250 MICRON PARTICLE DIAMETER



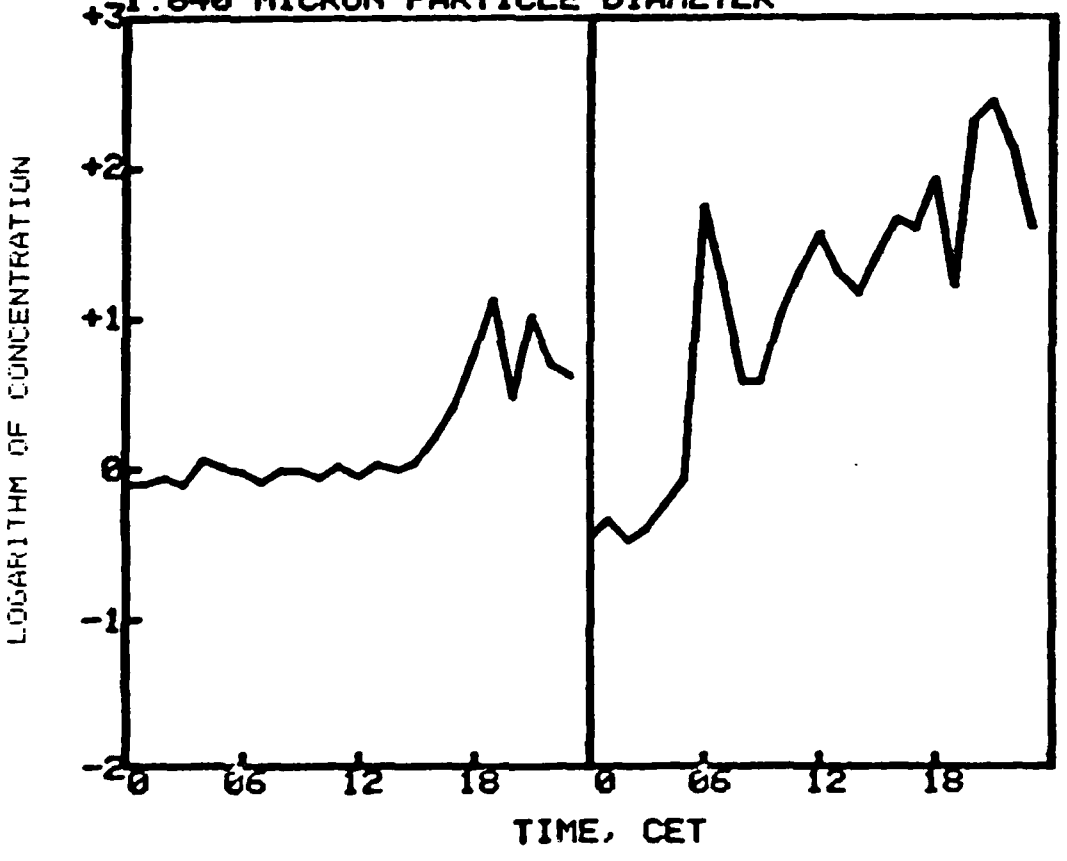
GARMISCH, 740 M WANK, 1783 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

1.840 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

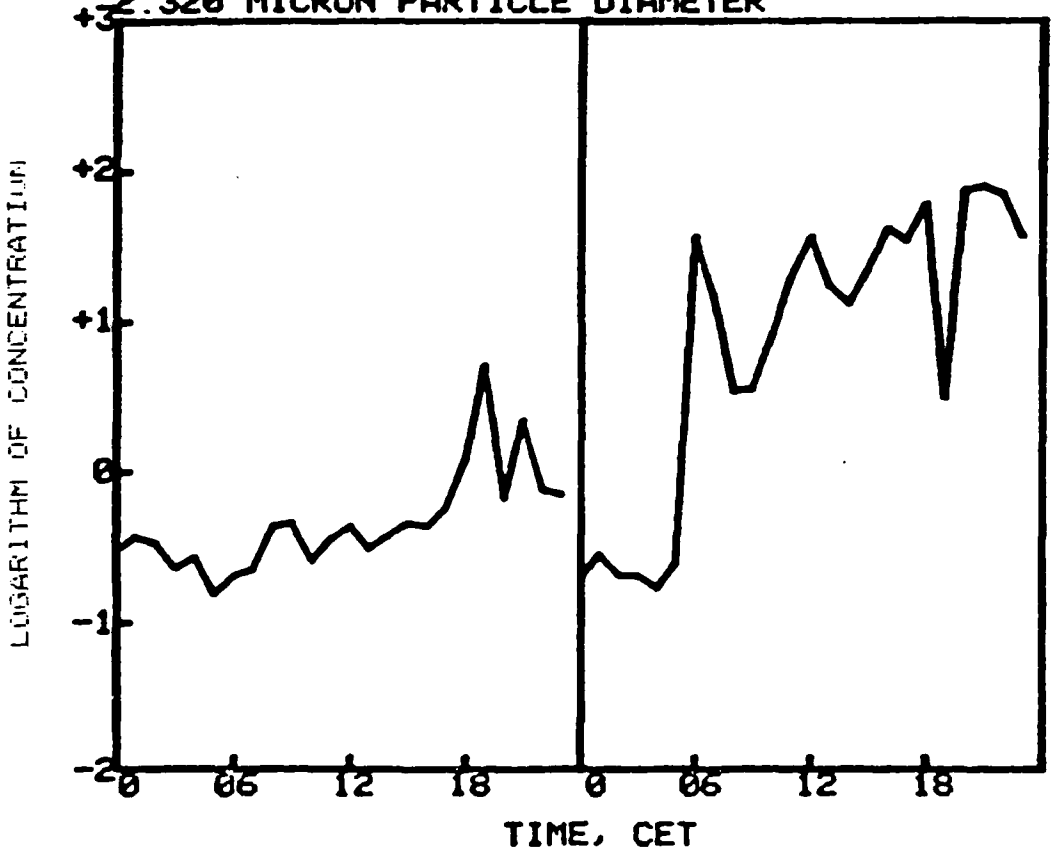
PLOT 6.4

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

2.320 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

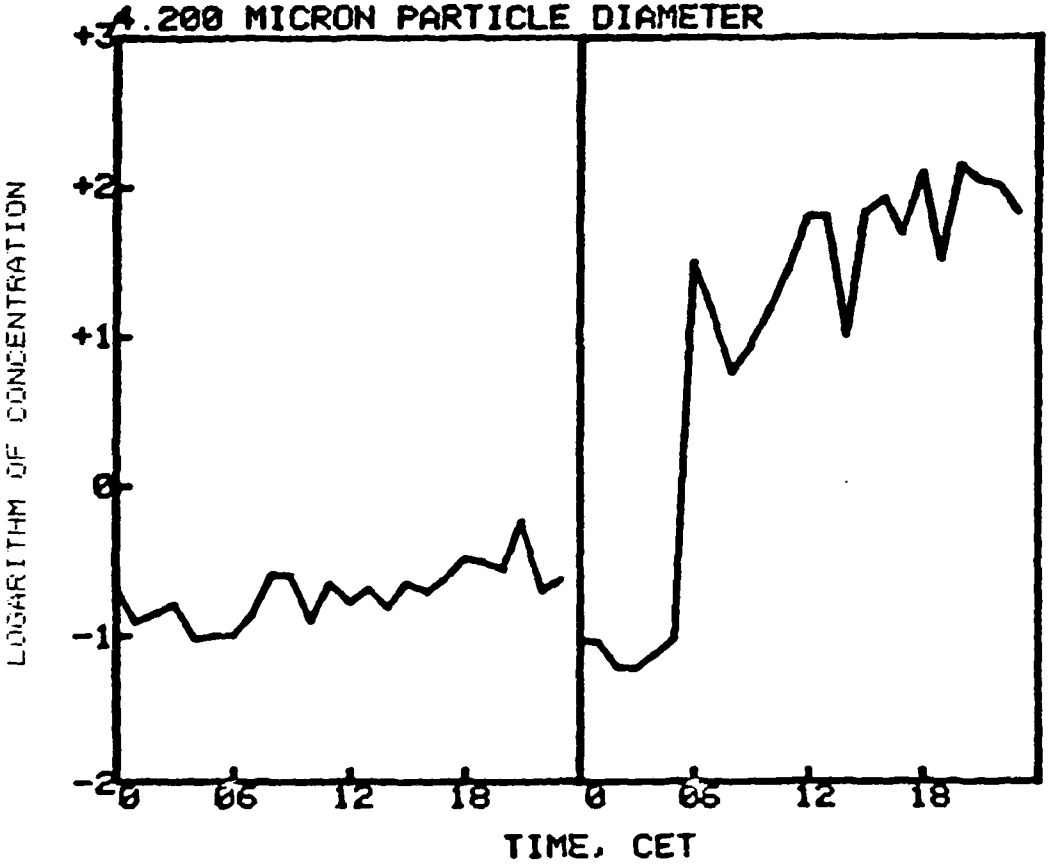
PLOT 6.5

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

4.200 MICRON PARTICLE DIAMETER



GARMISCH, 748 M WANK, 1783 M

AD-A121 548 PARAMETERIZATION OF THE VERTICAL PROFILE OF THE AEROSOL CONSTITUTION IN T.. (U) FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCH.. R REITER ET AL. 2/2

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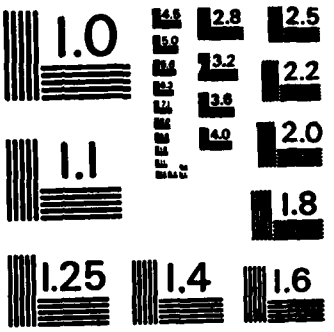

MICROCOPY RESOLUTION TEST CHART
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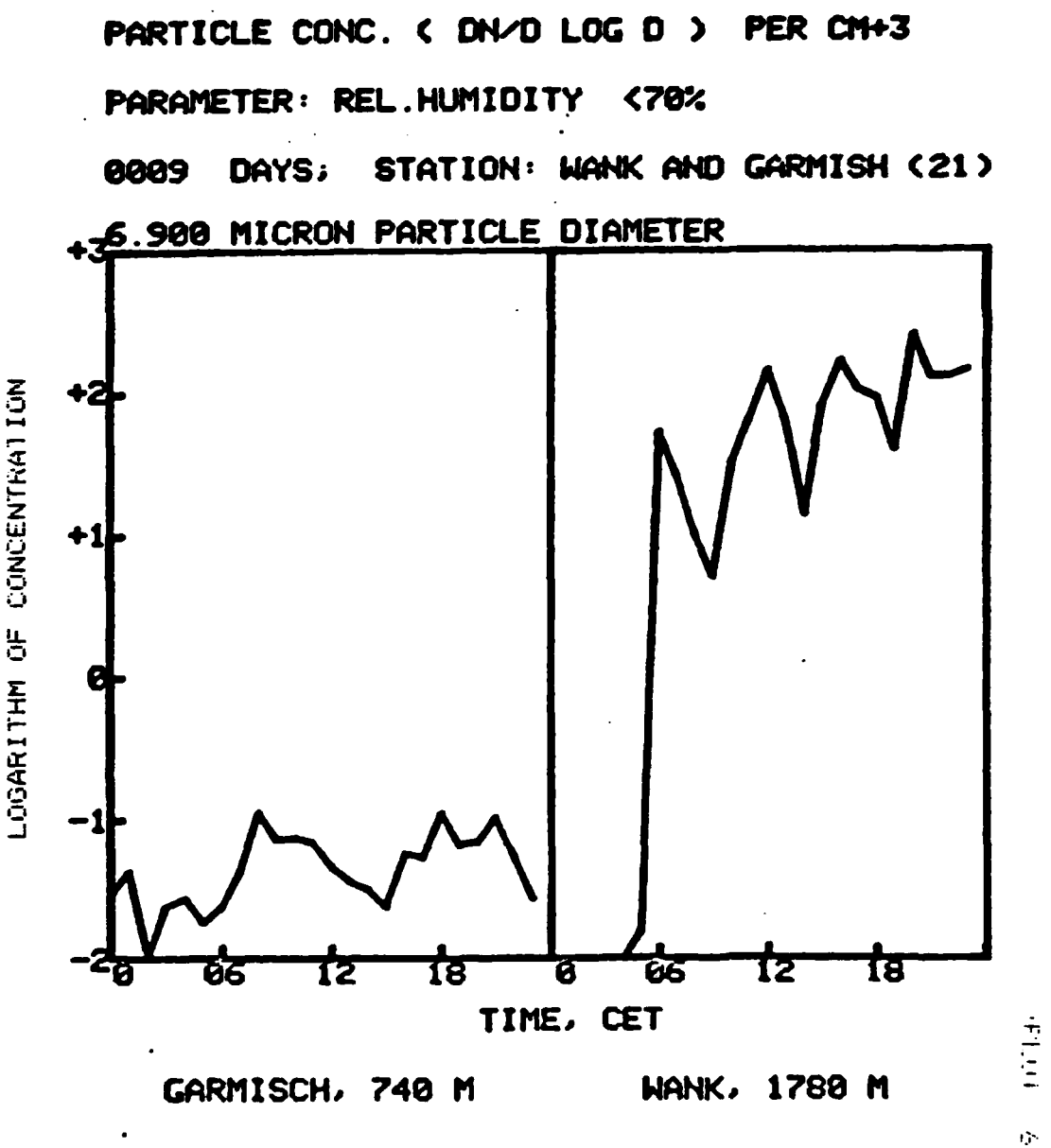
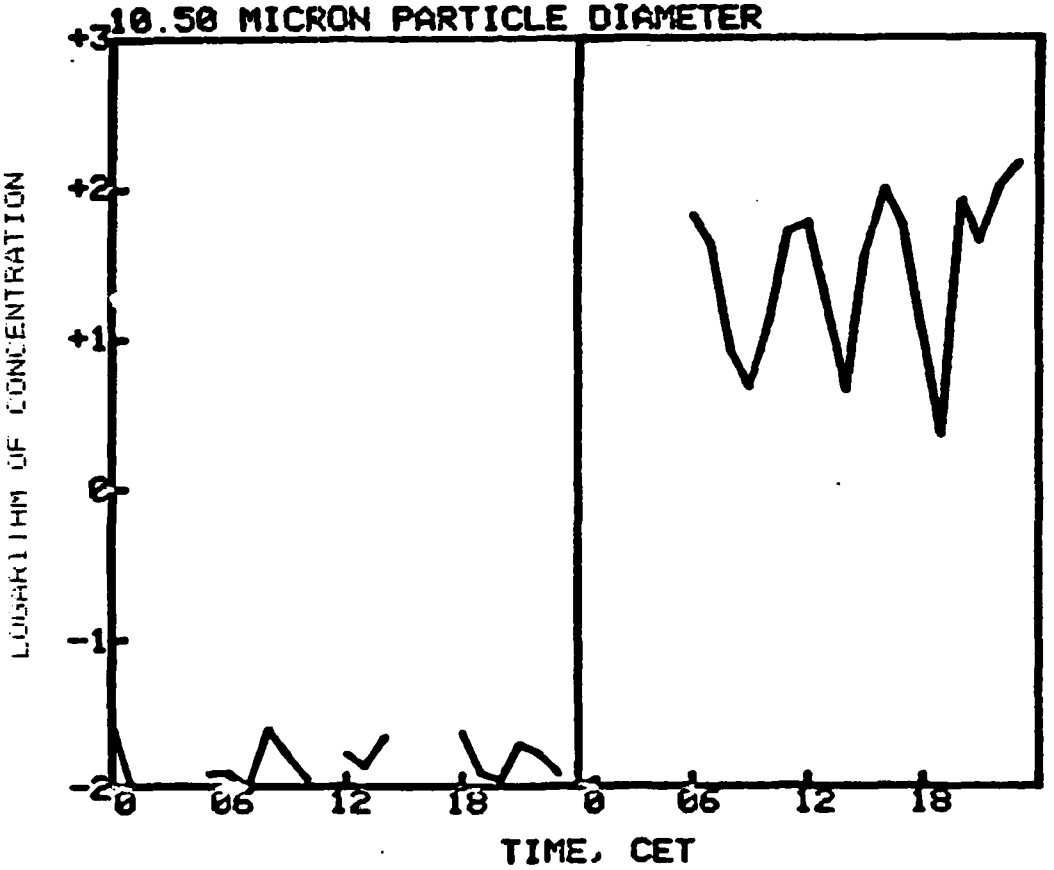

PARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: REL.HUMIDITY <70%
0009 DAYS; STATION: WANK AND GARMISH (21)
6.900 MICRON PARTICLE DIAMETER
LOGARITHM OF CONCENTRATION
+3
+2
+1
0
-1
-2
0
06
12
18
0
06
12
18
TIME, CET
GARMISCH, 740 M
WANK, 1780 M

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

10.50 MICRON PARTICLE DIAMETER



LOGARITHM OF CONCENTRATION

GARMISCH, 740 M WANK, 1780 M

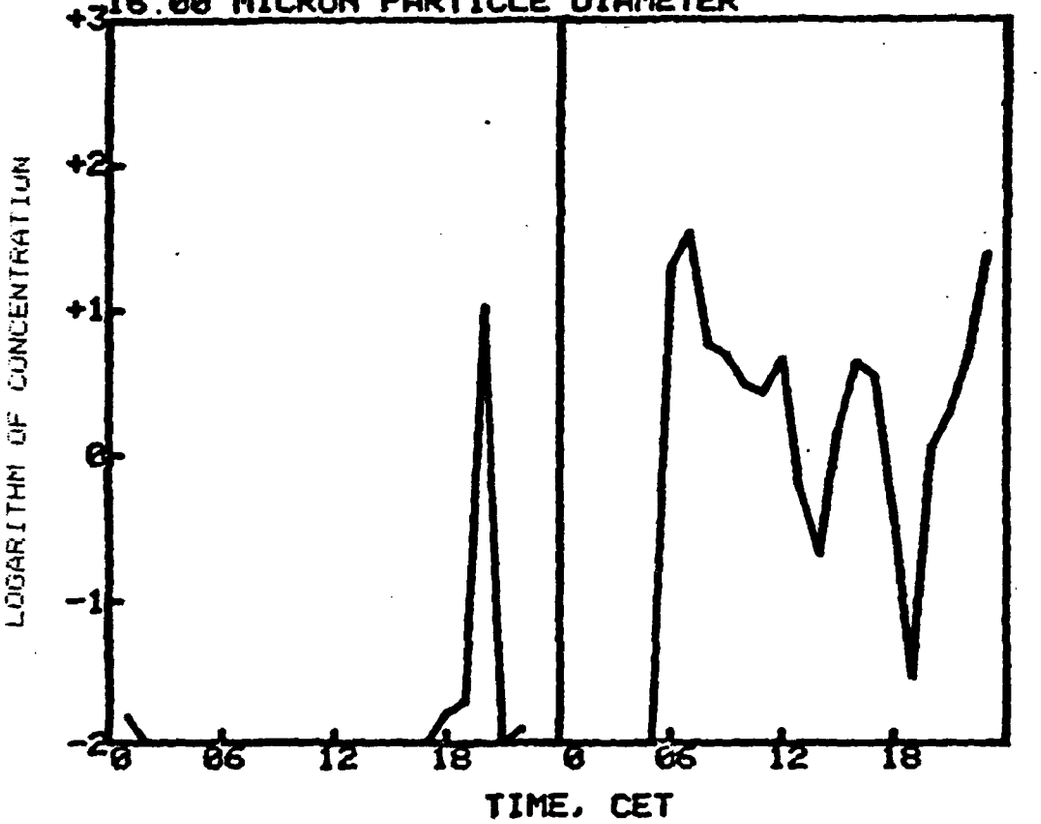
PLOT: 6.8

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: REL.HUMIDITY <70%

0009 DAYS; STATION: WANK AND GARMISH (21)

16.00 MICRON PARTICLE DIAMETER



GARMISCH, 740 M WANK, 1780 M

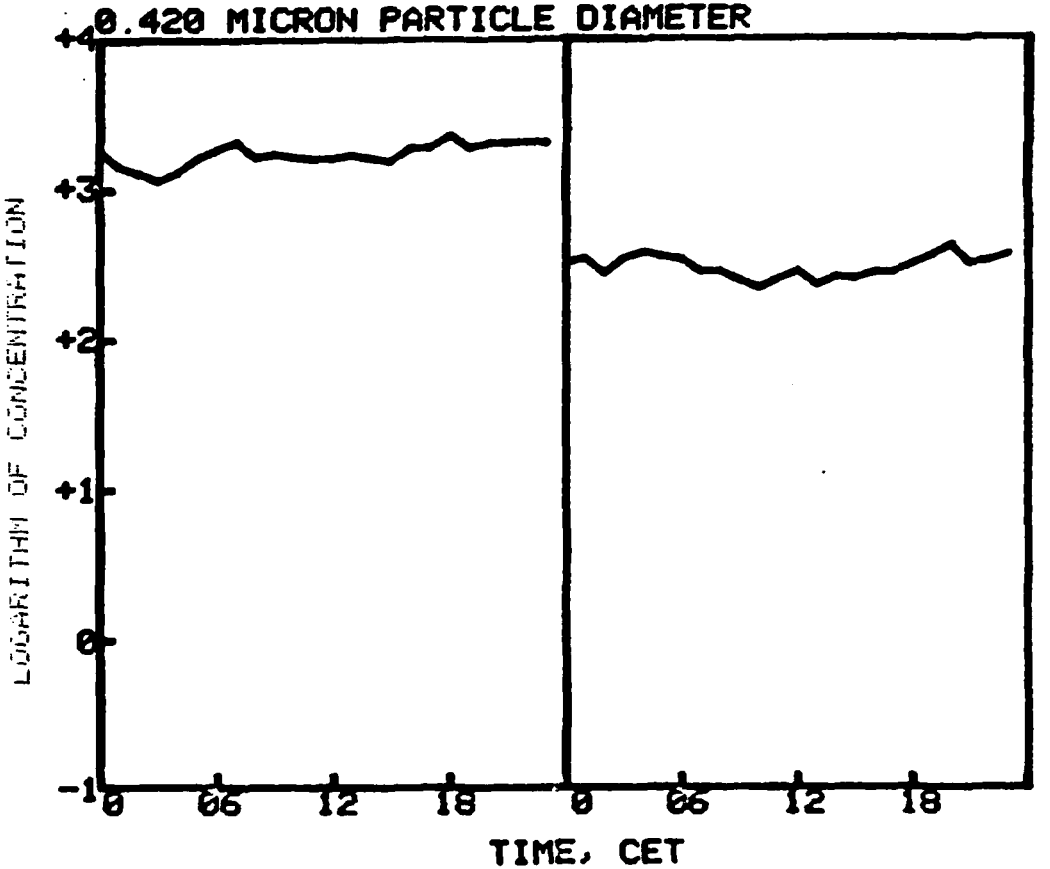
PLOT 8.8

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

0.420 MICRON PARTICLE DIAMETER



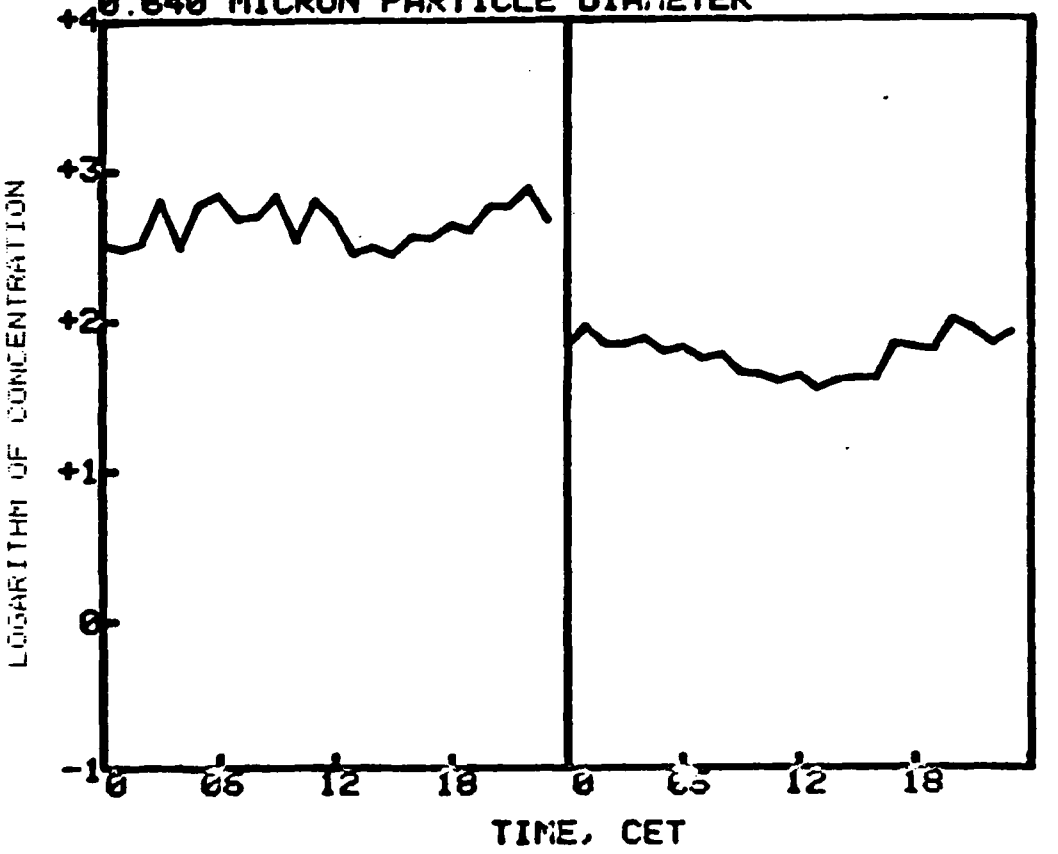
> 0.040 MG/M-3 < 0.001 MG/M-3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

0.640 MICRON PARTICLE DIAMETER



> 0.640 MG/M-3 < 0.631 MG/M-3

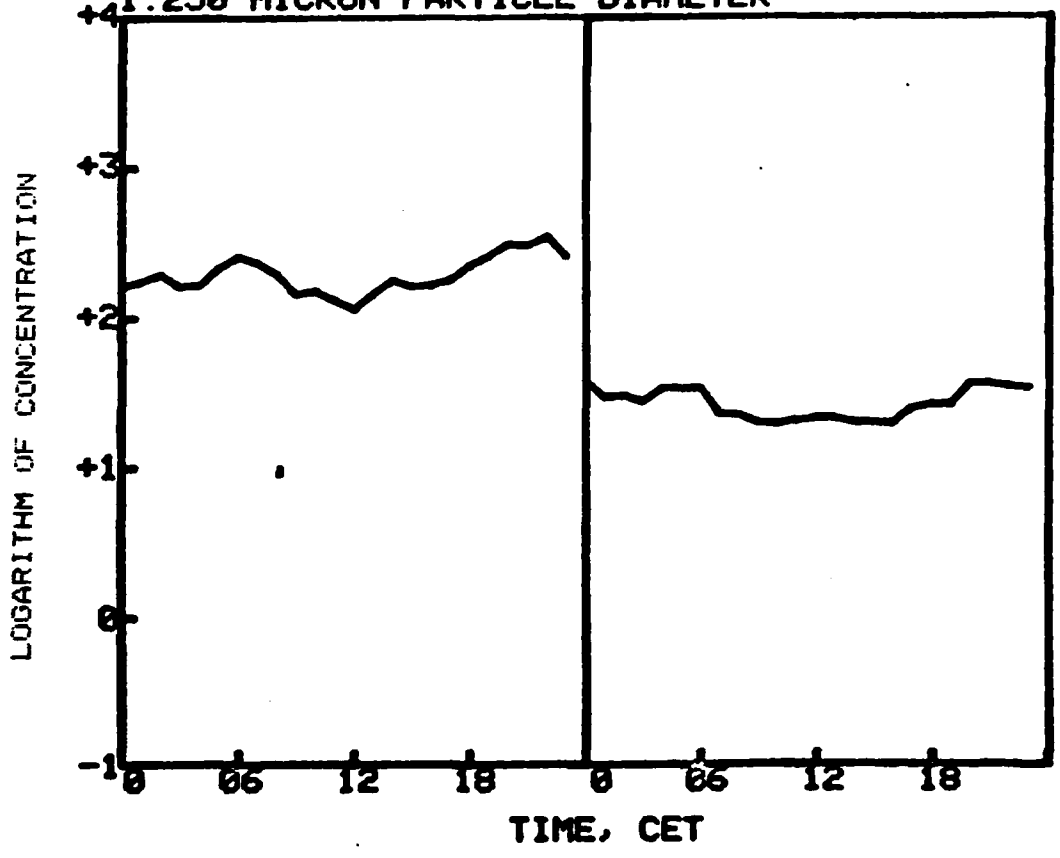
PLOT 7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

1.250 MICRON PARTICLE DIAMETER



> 0.040 MG/M-3 < 0.001 MG/M-3

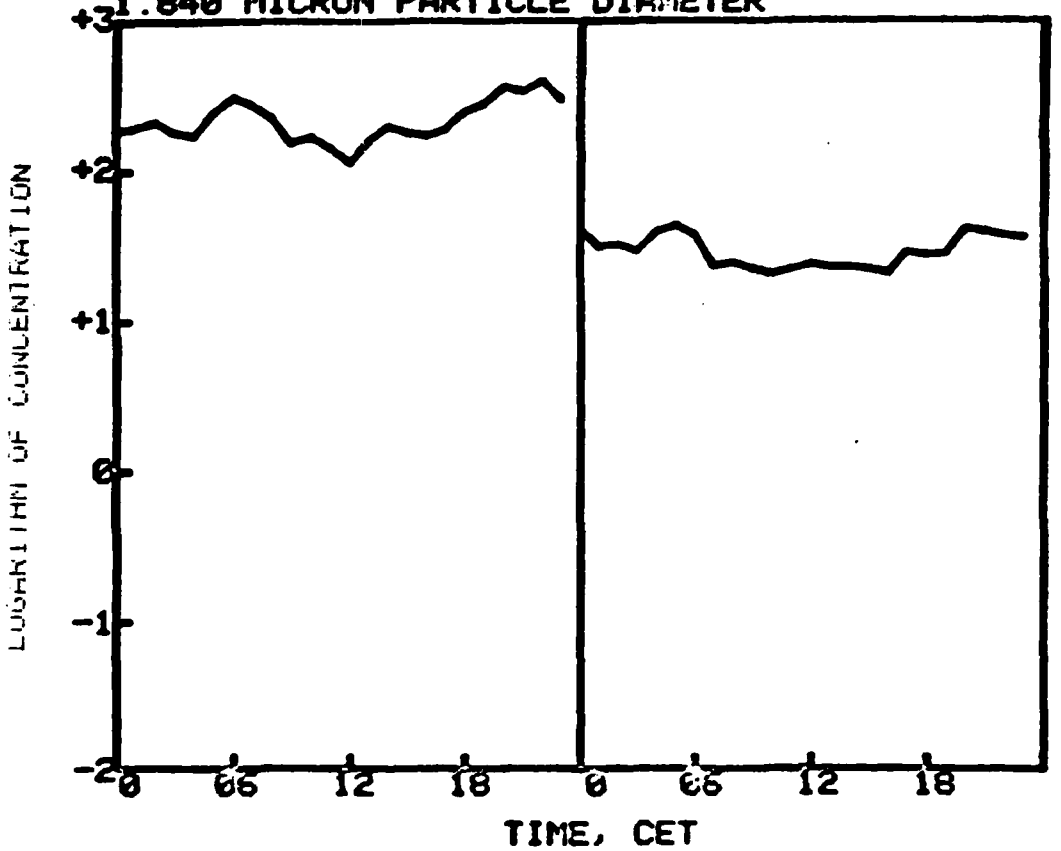
PLOT: 7.3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

1.840 MICRON PARTICLE DIAMETER



> 0.040 MG/M-3 < 0.031 MG/M-3

FIG. 7.4

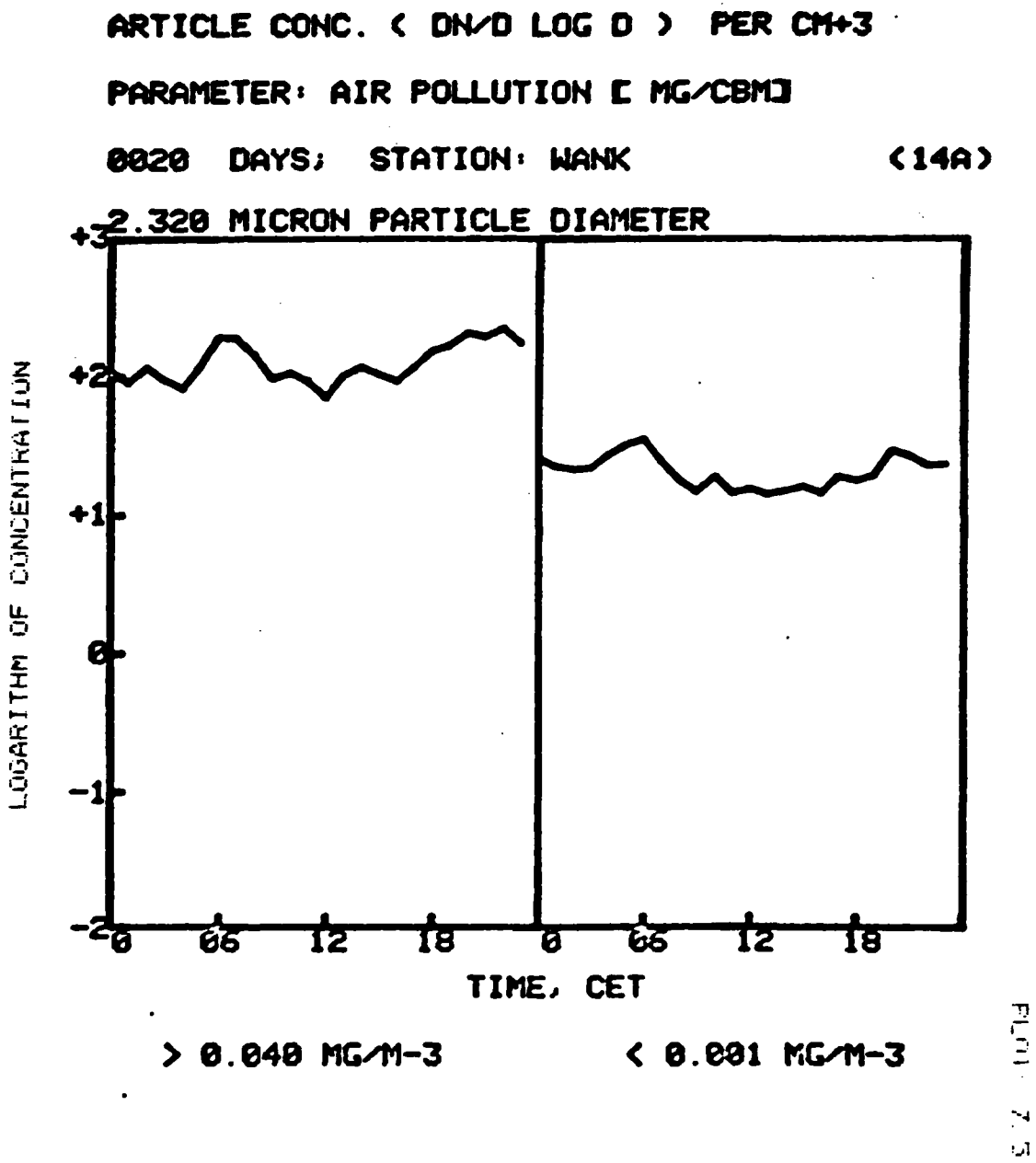

ARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: AIR POLLUTION [MG/CBM]
0020 DAYS; STATION: WANK (14A)
2.320 MICRON PARTICLE DIAMETER
LOGARITHM OF CONCENTRATION
+3
+2
+1
0
-1
-2
0
06
12
18
0
06
12
18
TIME, CET
> 0.040 MG/M-3
< 0.001 MG/M-3

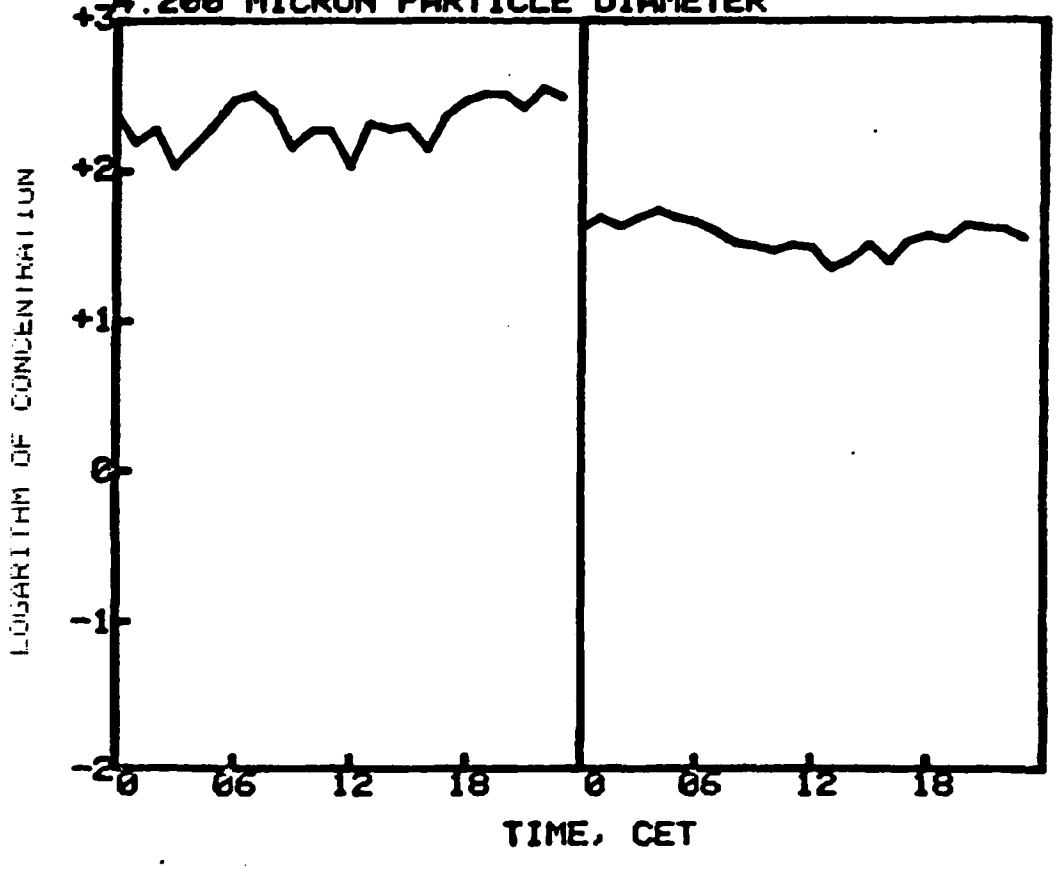
FIG. 7.5

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

4.200 MICRON PARTICLE DIAMETER



> 0.040 MG/M-3 < 0.001 MG/M-3

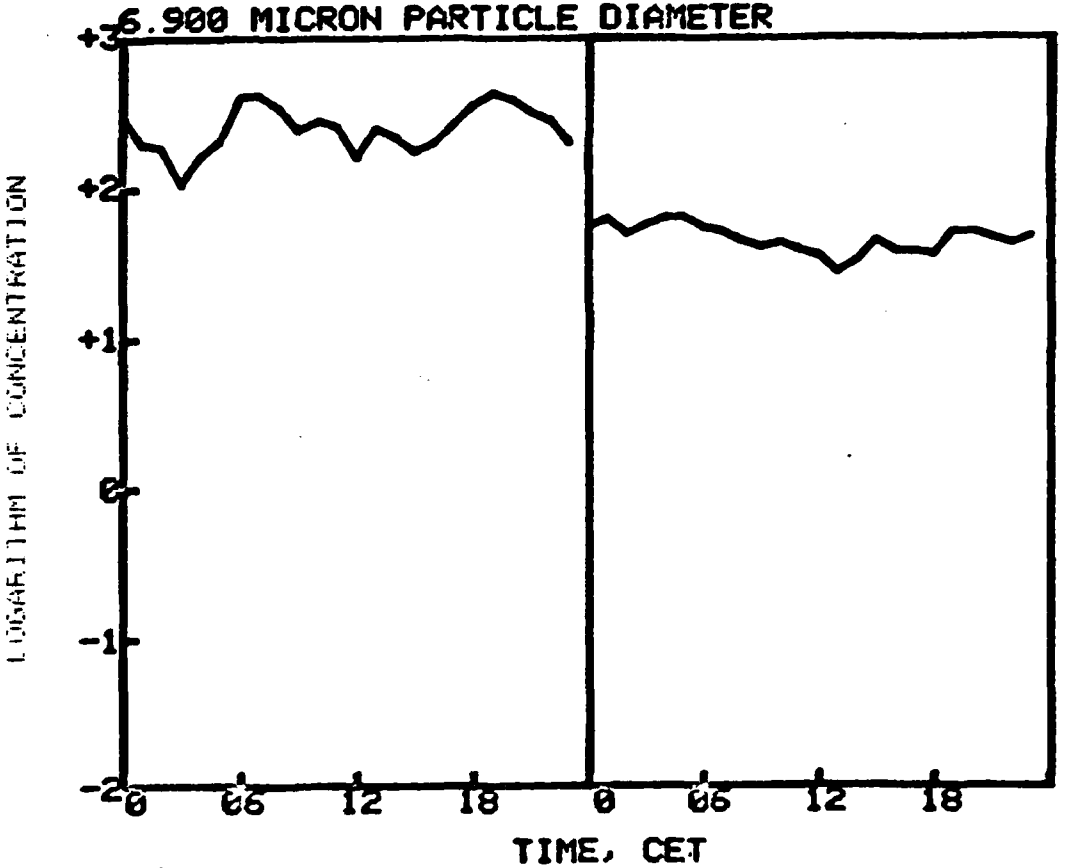
FL01

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

6.900 MICRON PARTICLE DIAMETER



> 0.040 MG/M-3 < 0.001 MG/M-3

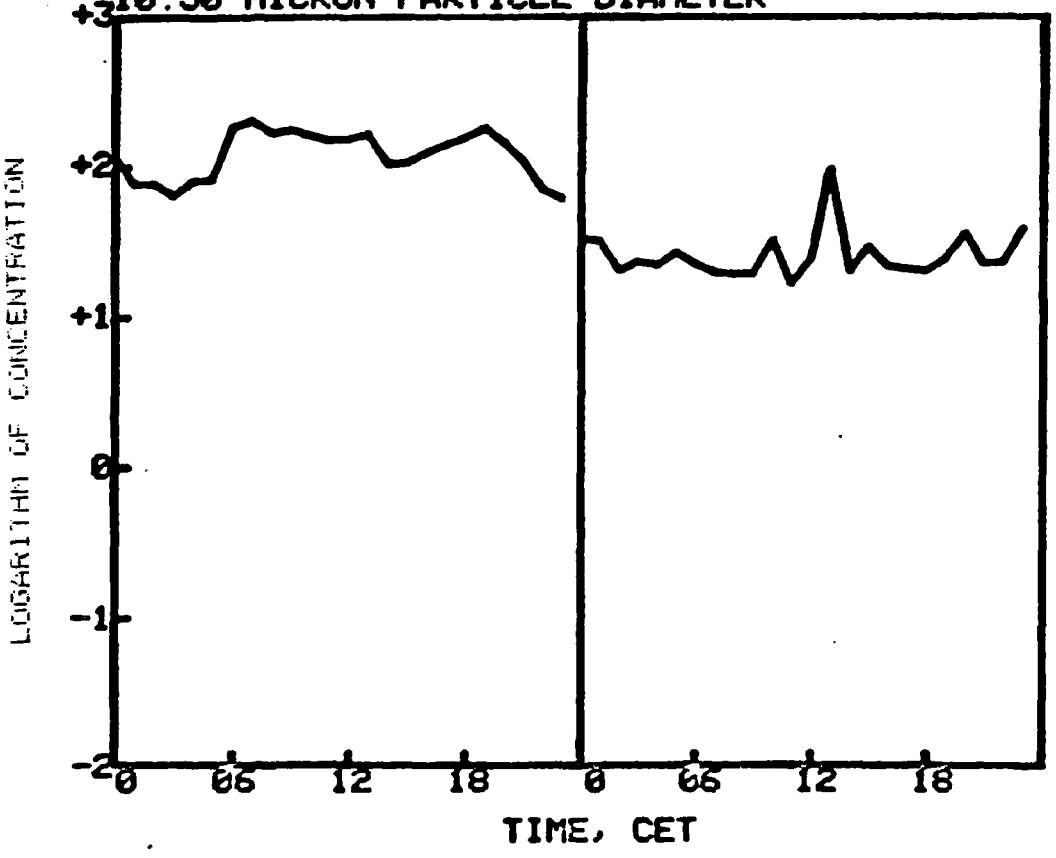
PLOT 7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)

10.50 MICRON PARTICLE DIAMETER



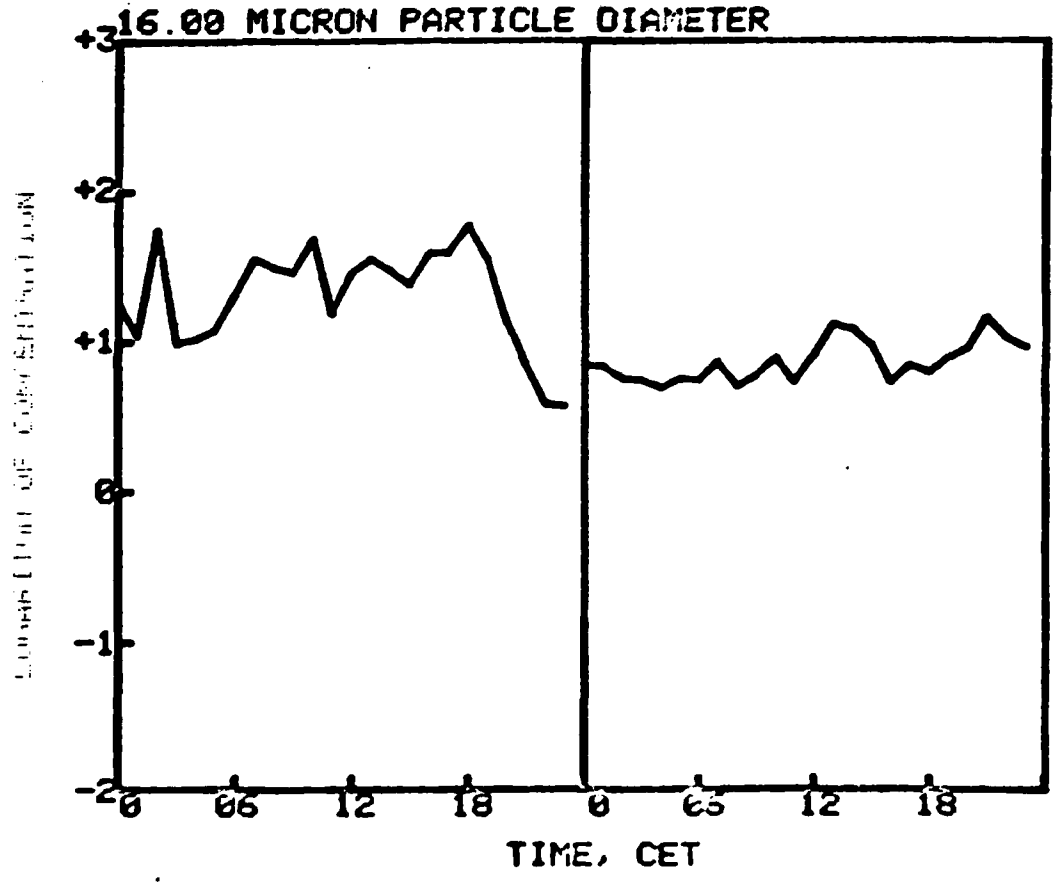
> 0.040 MG/M-3 < 0.001 MG/M-3

PLOT 7

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: AIR POLLUTION [MG/CBM]

0020 DAYS; STATION: WANK (14A)



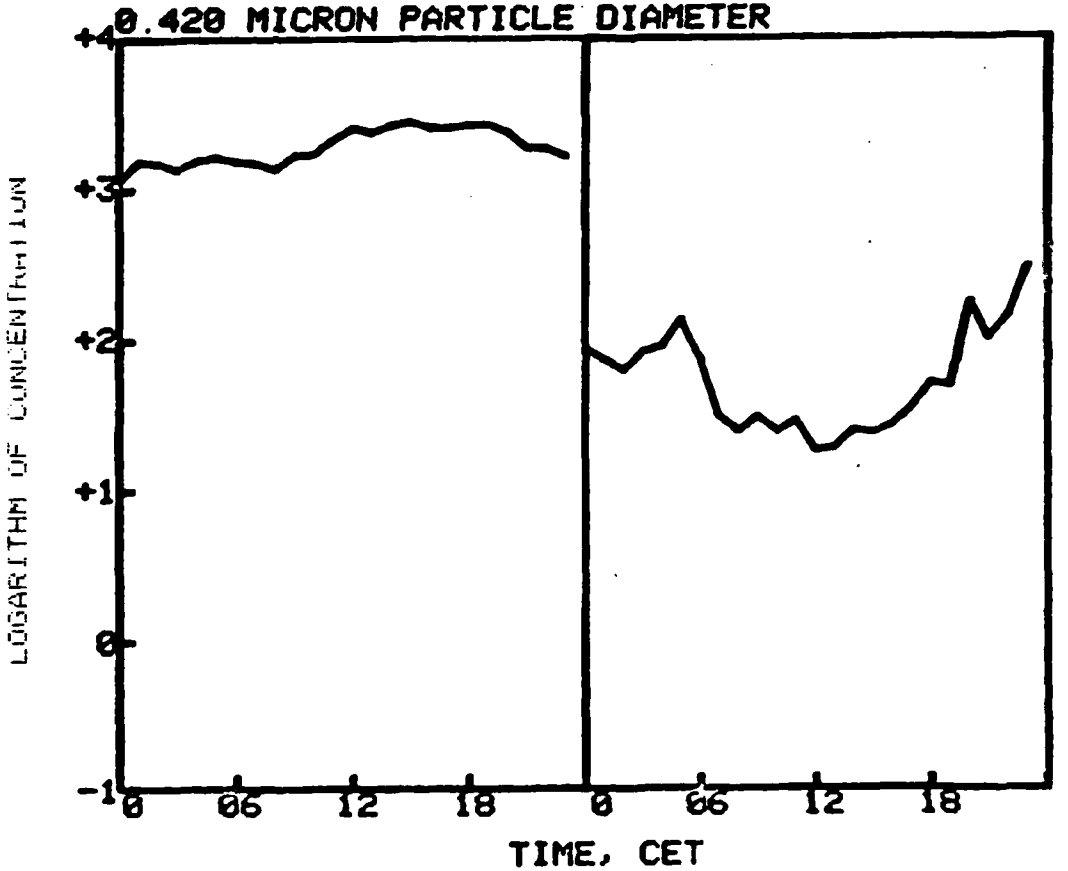
> 0.040 MG/M-3 < 0.031 MG/M-3

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: VISIBILITY RANGE [KM]

0034 DAYS; STATION: WANK (16A)

0.420 MICRON PARTICLE DIAMETER



< 2KM

> 58KM

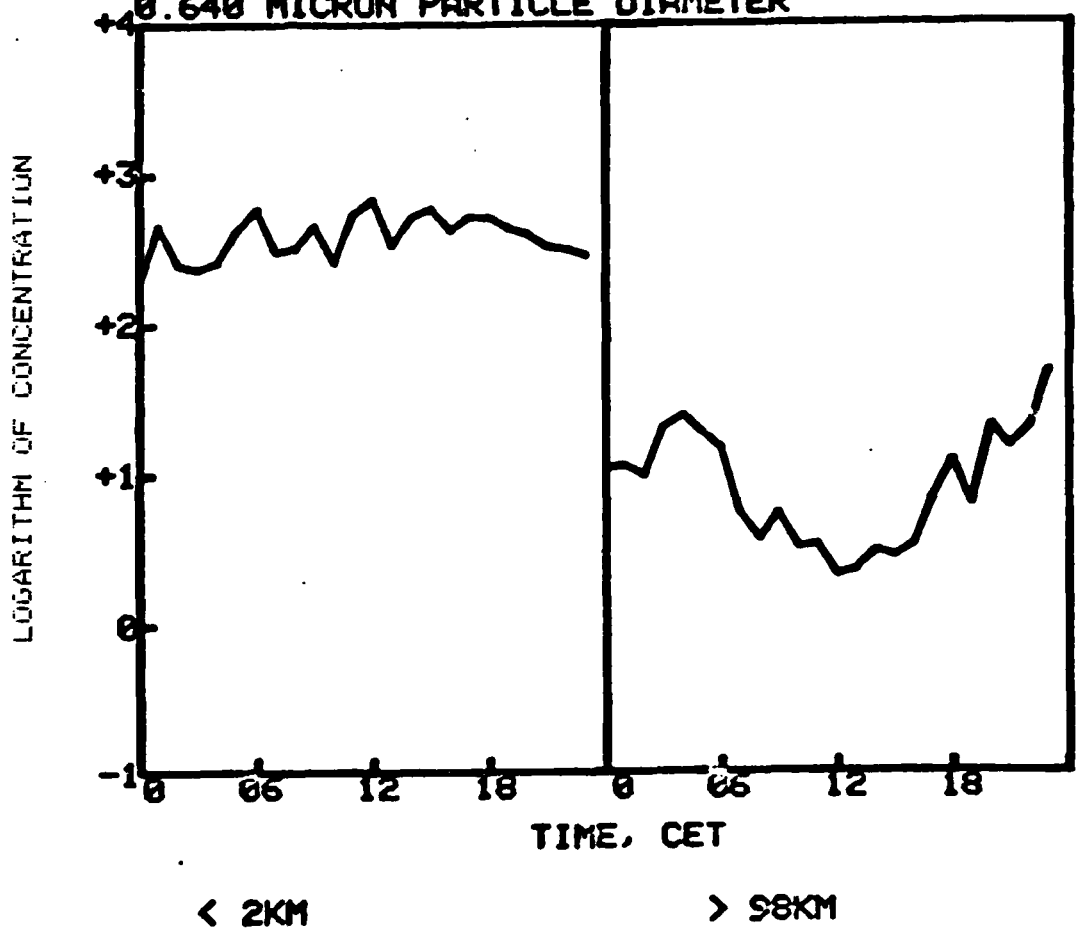
PLOT: 8.1

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: VISIBILITY RANGE [KM]

0034 DAYS; STATION: WANK (16A)

0.640 MICRON PARTICLE DIAMETER



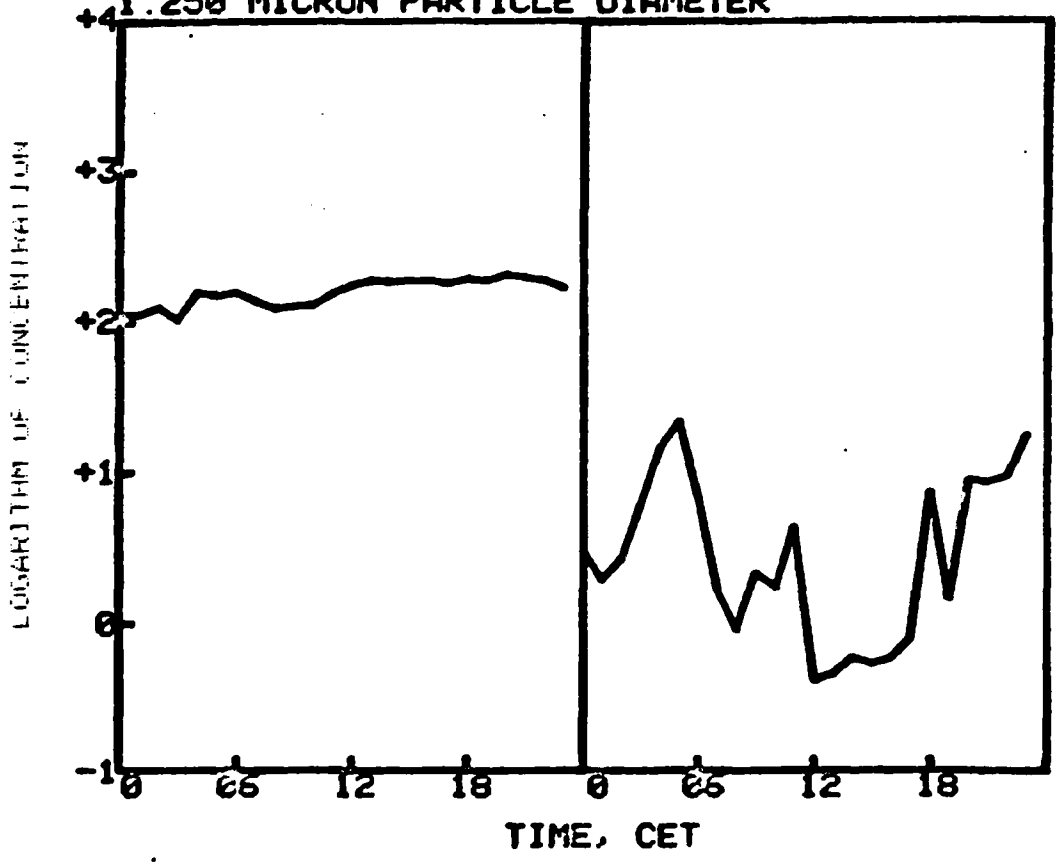
PLOT: 8.2

PARTICLE CONC. (DN/D LOG D) PER CM+3

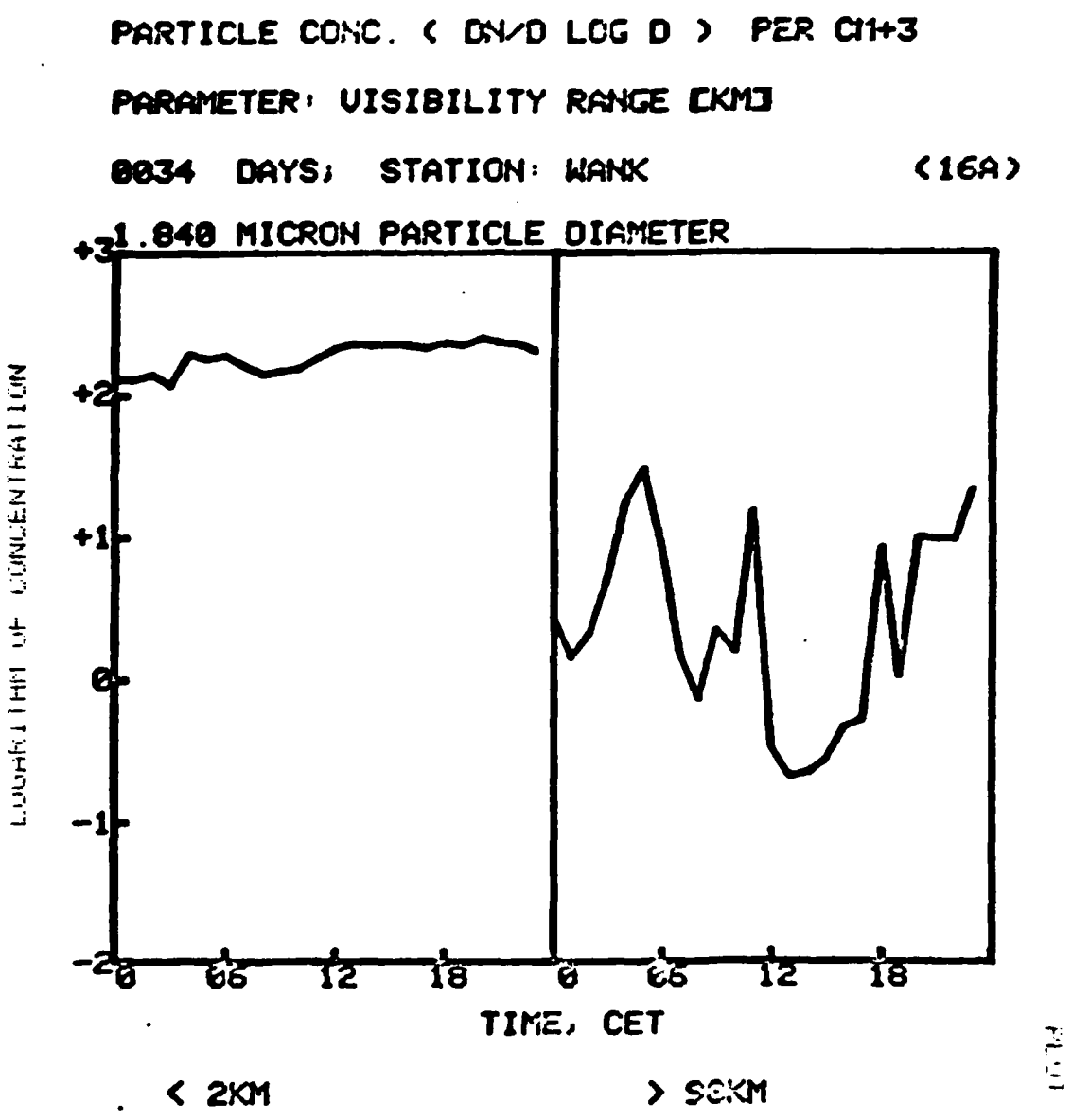
PARAMETER: VISIBILITY RANGE [KM]

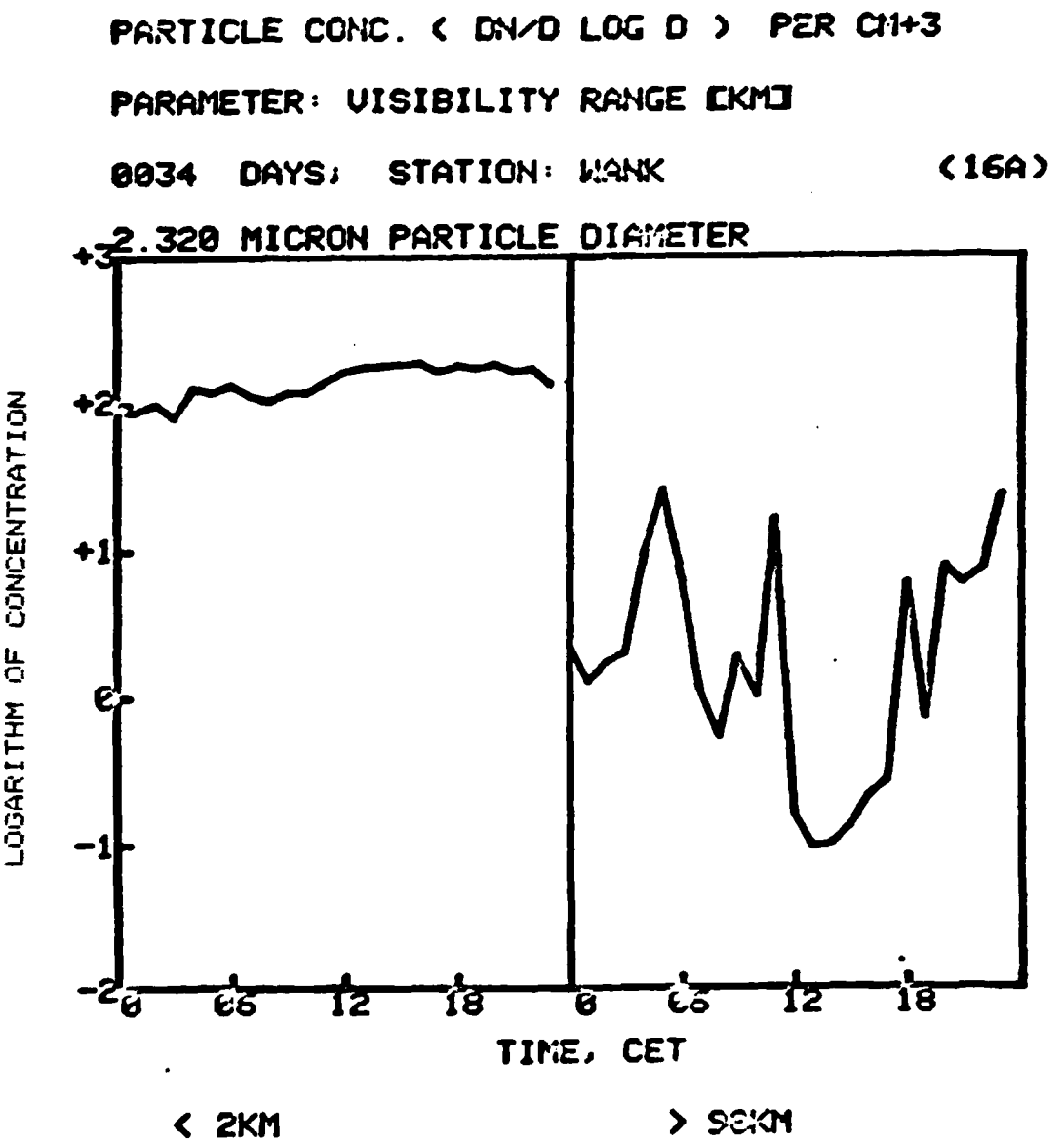
0034 DAYS; STATION: WANK (16A)

1.250 MICRON PARTICLE DIAMETER



< 2KM > 98KM


PARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: VISIBILITY RANGE [KM]
0034 DAYS; STATION: WANK (16A)
1.840 MICRON PARTICLE DIAMETER
+3
+2
+1
0
-1
-2
0
06
12
18
0
06
12
18
TIME, CET
< 2KM
> 50KM

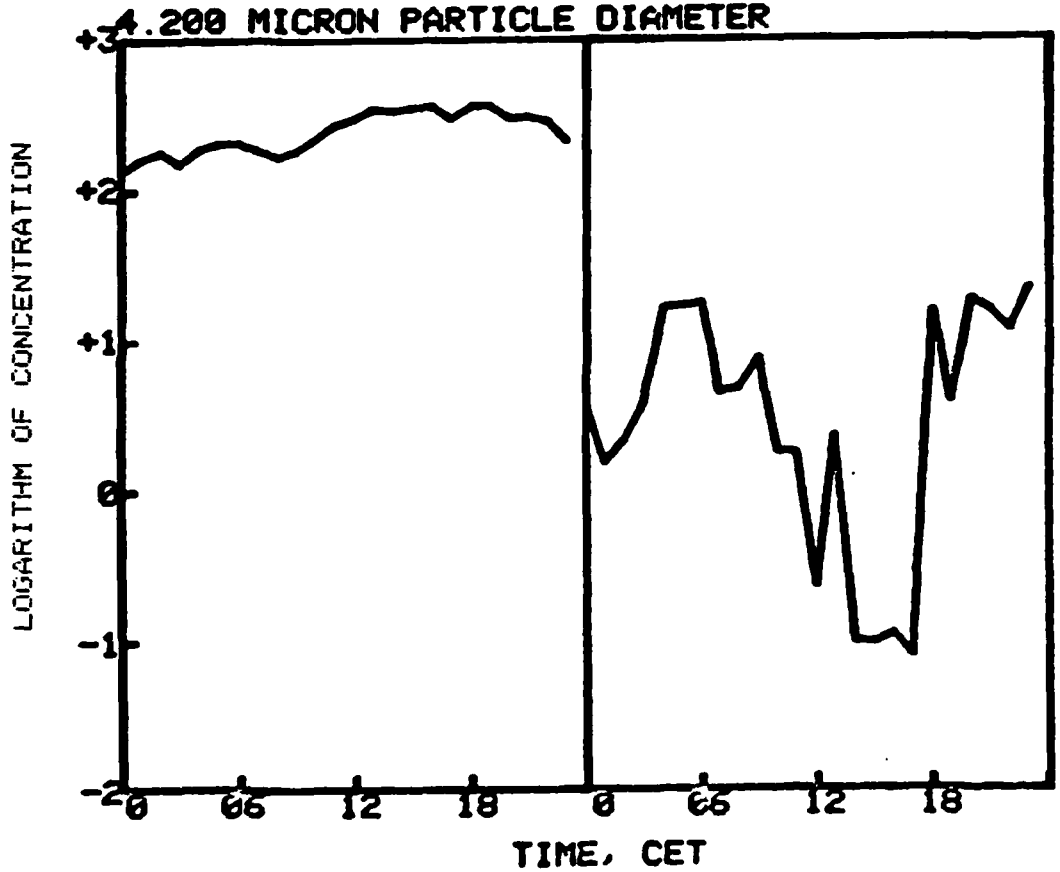

PARTICLE CONC. (DN/D LOG D) PER CM+3
PARAMETER: VISIBILITY RANGE [KM]
0034 DAYS; STATION: WANK (16A)
2.320 MICRON PARTICLE DIAMETER
LOGARITHM OF CONCENTRATION
+3
+2
+1
0
-1
-2
0
06
12
18
0
06
12
18
TIME, CET
< 2KM
> 50KM

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: VISIBILITY RANGE [KM]

0034 DAYS; STATION: WANK (16A)

4.200 MICRON PARTICLE DIAMETER



< 2KM > 98KM

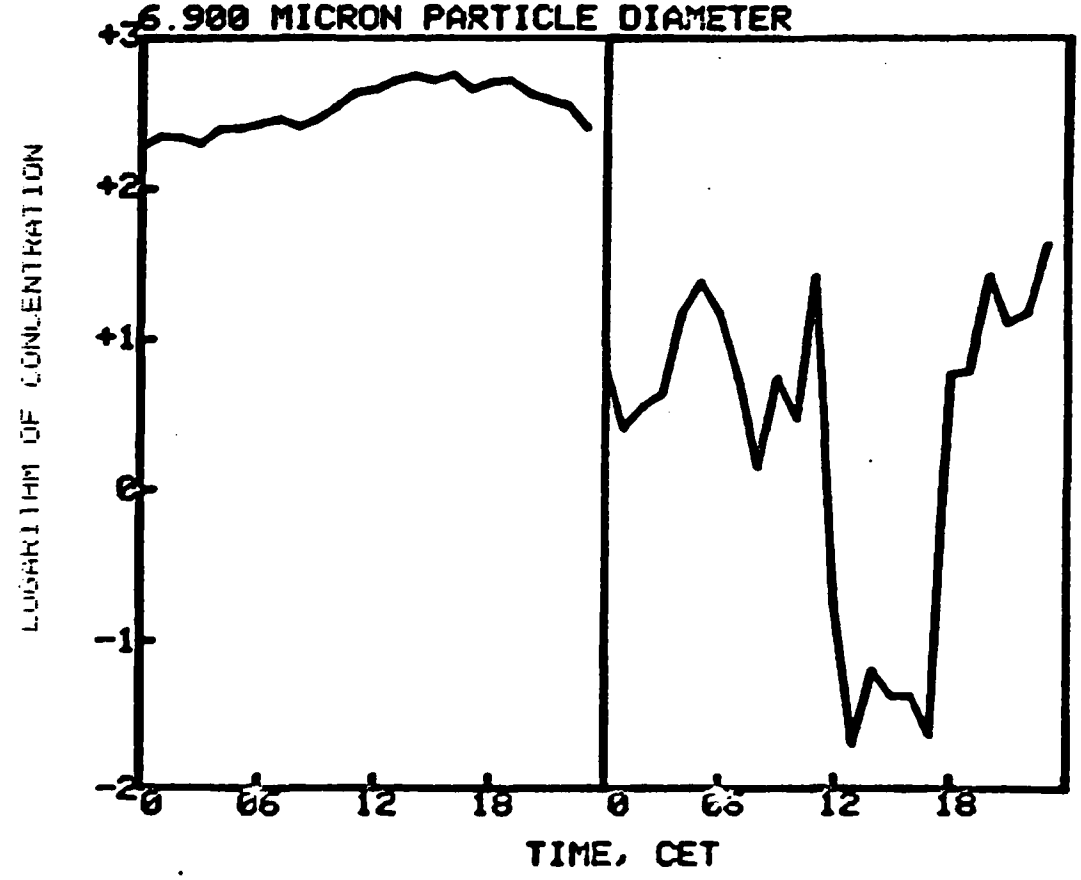
PLOT 8

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: VISIBILITY RANGE [KM]

0034 DAYS; STATION: WANK (16A)

6.900 MICRON PARTICLE DIAMETER



< 2KM > 98KM

PLOT: 8.8

PARTICLE CONC. < DN/D LOG D > PER CM+3

PARAMETER: VISIBILITY RANGE CKM3 (16A)

0034 DAYS; STATION: WANK

0.50 MICRON PARTICLE DIAMETER

LOGARITHM OF CONCENTRATION

+3 +2 +1 0 -1 -2

06 12 18 00 06 12 18

TIME, CET

< 2KM

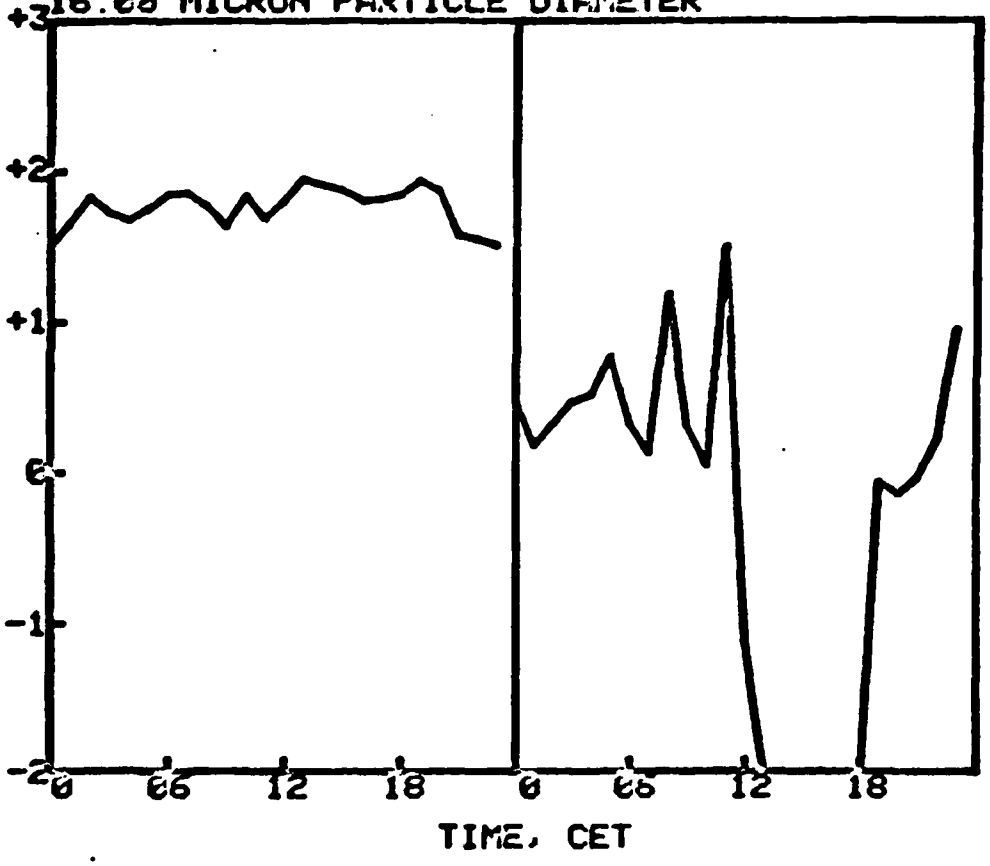
> 98KM

PARTICLE CONC. (DN/D LOG D) PER CM+3

PARAMETER: JISIBILITY RANGE [KM]

0034 DAYS; STATION: WANK (16A)

16.00 MICRON PARTICLE DIAMETER



< 2KM > 98KM

END

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